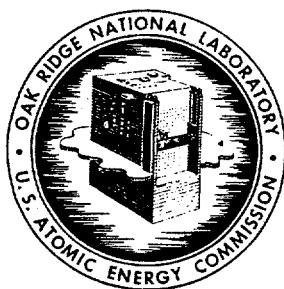


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Report for the Month of November 1969

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.21% of the MPC_W for a release to an uncontrolled area (see Figure 1). The two main contaminants, strontium and iodine, contributed 90.0% and 5.8%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the strontium and gross beta activity measurements made at the five creek sampling stations. A monthly comparison of strontium releases into White Oak Lake is given in Figure 2.

Process Waste System

A total of 8.2 million gallons of contaminated water was chemically treated this month. Plant efficiency, based upon gross beta analysis of the influent and effluent streams, amounted to 88%. The amount of radioactivity discharged into White Oak Creek from this system is shown in Table 1 and Figure 3. The sources of wastes discharged into the system are listed in Table 2. Figure 4 compares the volumes handled each month.

Intermediate Level Waste

The evaporator operated at a boil-down rate of 335 gph--slightly greater than 50% of capacity. A summary of operations is given below:

	<u>Gallons</u>
Total volume generated	242,000
Volume transferred to evaporator	241,000
Tank farm free space at beginning of month	465,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	63,000

A list of the major contributors is given below. Figure 5 compares the volumes generated each month.

	<u>Gallons</u>
Building 3019	66,000
4500 Complex	35,000
ORR and BSR	31,000
Fission Products Development Laboratory	20,000
Nuclear Safety Pilot Plant	10,000

Gaseous Waste

A total of 1.15 curies of gaseous ^{131}I was released this month by ORNL stacks; 0.89 curie came from the 3039 system. There were no significant amounts of alpha or particulate activities discharged during the period. Table 3 lists the releases from individual stack areas. Figure 6 compares releases on a monthly basis.

Inert gases (calculated as ^{133}Xe) released from the 3039 and 7911 stacks averaged 1.73% and 0.39% of the calculated Maximum Permissible Operating Level.

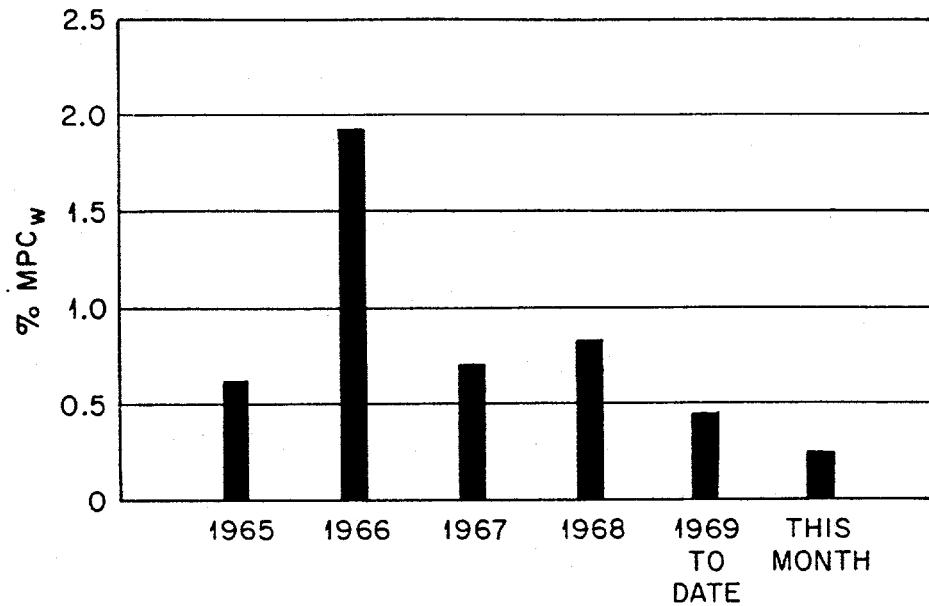


Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

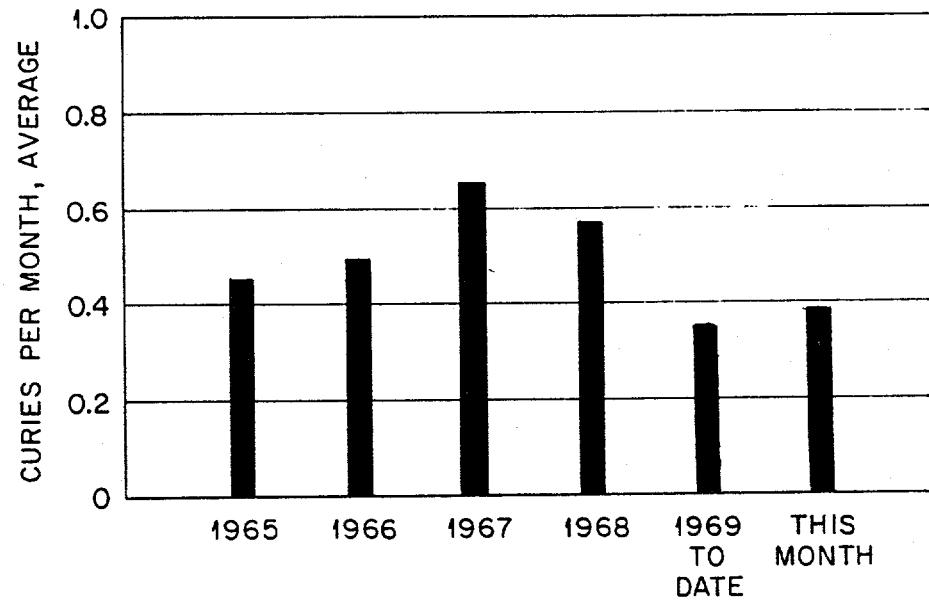


Fig. 2. Total ⁸⁹Sr and ⁹⁰Sr Released to White Oak Lake as
Measured at Sampling Stations 3 and 4 (See Fig. 7).

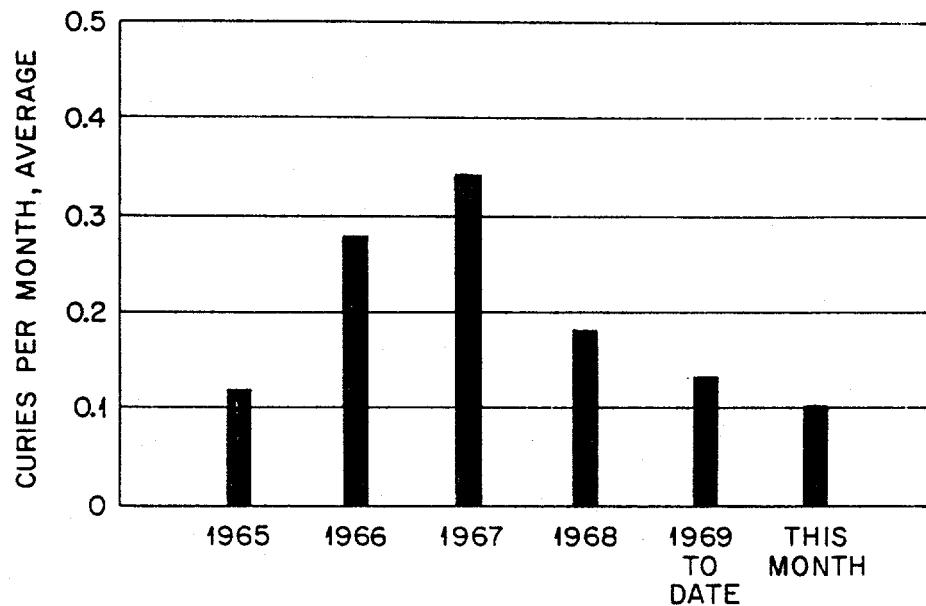


Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

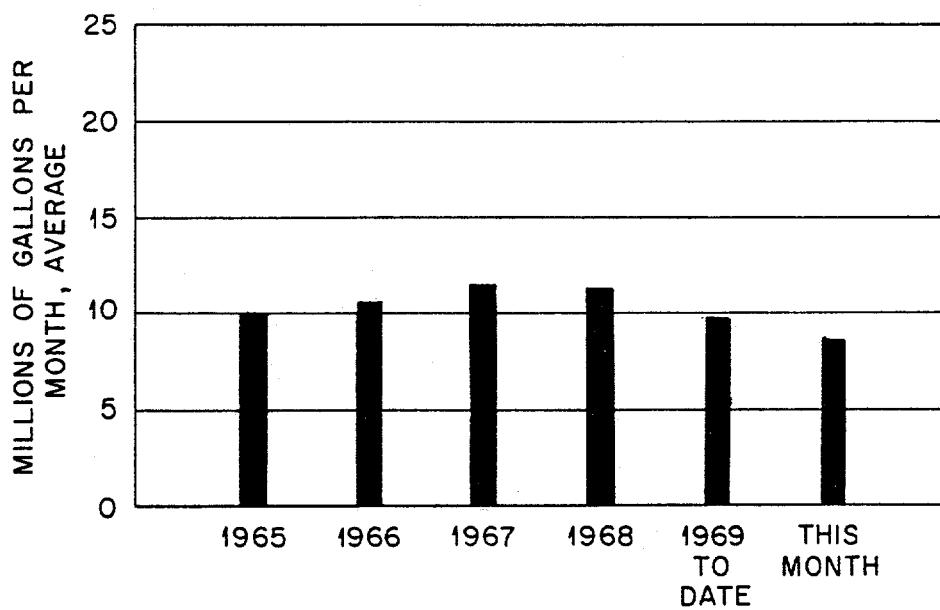


Fig. 4. Process Waste Volumes.

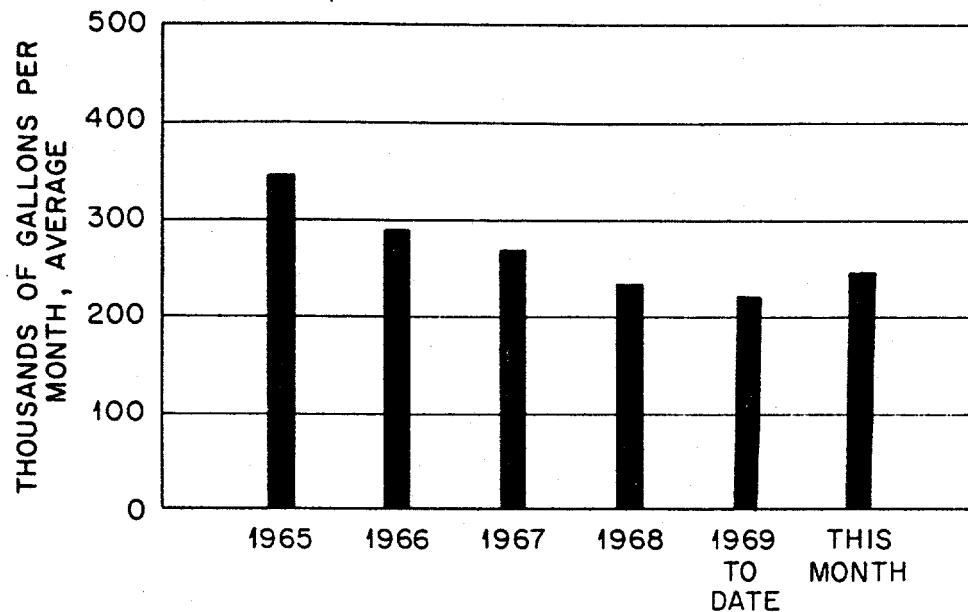


Fig. 5. Intermediate - Level Waste Volumes.

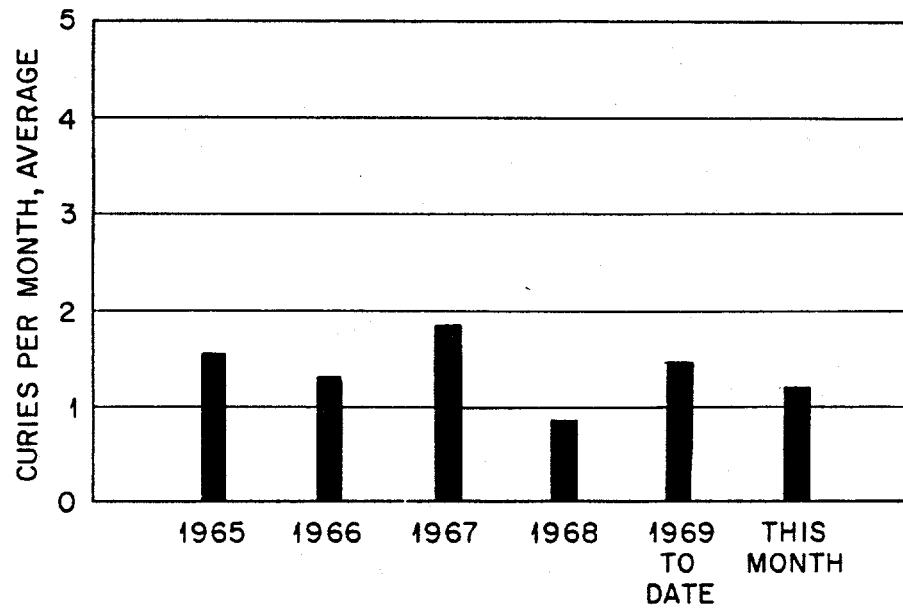


Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I); Does not include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

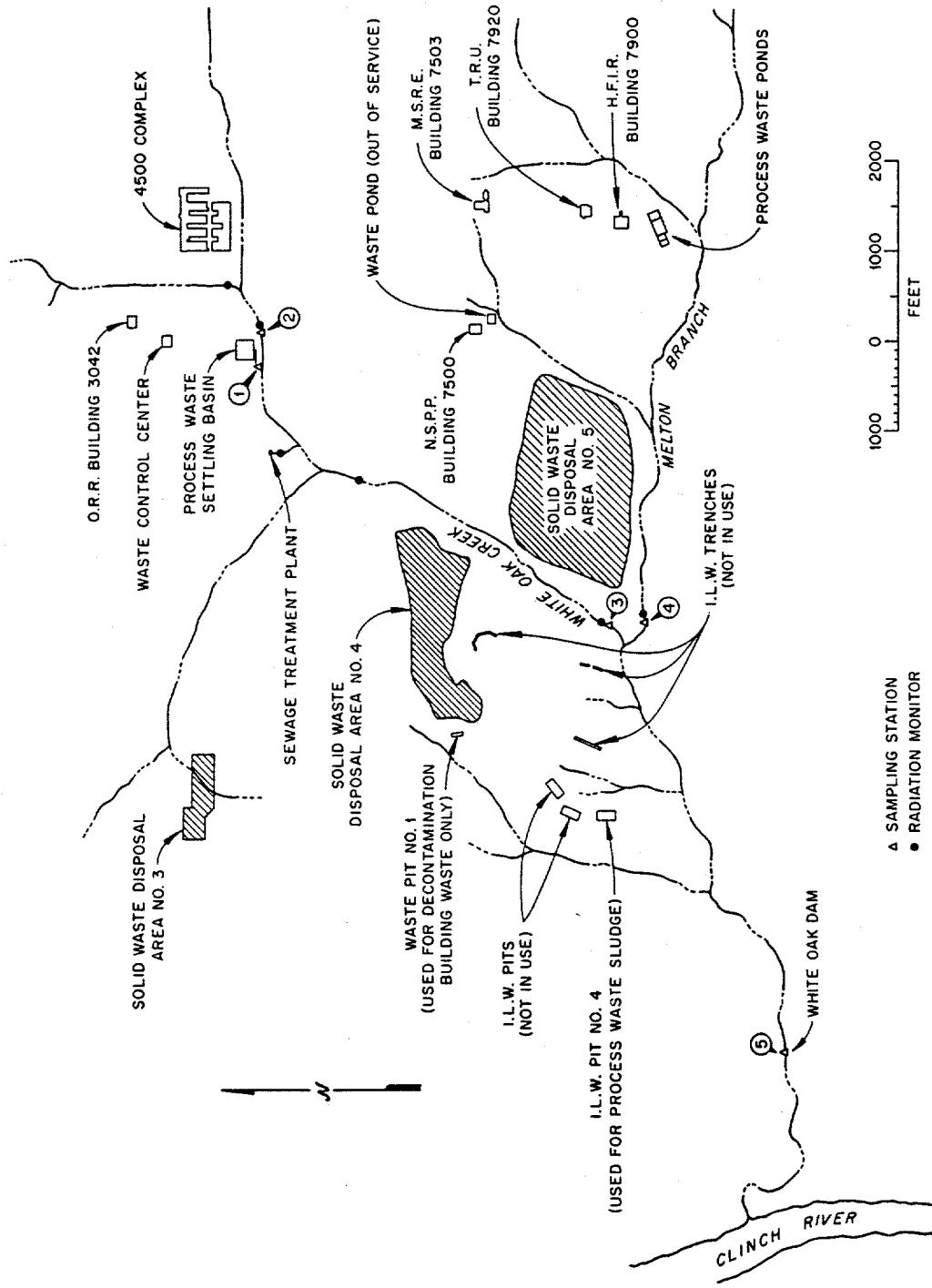


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1
ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process waste	1	0.10	0.35
Miscellaneous discharges from east end of plant	2	0.04	0.40
Discharge from Bethel Valley Area	3	0.29	1.24
Discharge from Melton Valley Area	4	0.09	0.17
Total discharge from all sources	3,4	0.38	1.41
White Oak Dam to Clinch River (Health Physics measurement)	5	0.14	0.47

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2
PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Curies	Gross Beta Activity ^a		Million Gallons	% of Total
			Total	% of Total		
1. Reactor Operations	.20 ^b	0.42 ^b	53.8	3.20	36.7	
2. Radioisotope Processing Area	54	0.19	24.4	0.52	6.0	
3. Buildings 3503 and 3508	11	0.04	5.1	0.59	6.8	
4. Buildings 3025 and 3026	10	0.03	3.8	2.04	23.4	
5. Building 3019	2	<0.01	--	0.24	2.8	^c
6. Fission Products Development Laboratory	119	0.08	10.3	0.11	1.3	
7. Waste Evaporator, Building 2531	2	0.02	2.6	1.45	16.6	
8. Buildings 3525 and 3550	<1	<0.01	--	0.50	5.7	
9. Building 2026	3	<0.01	--	0.06	0.7	

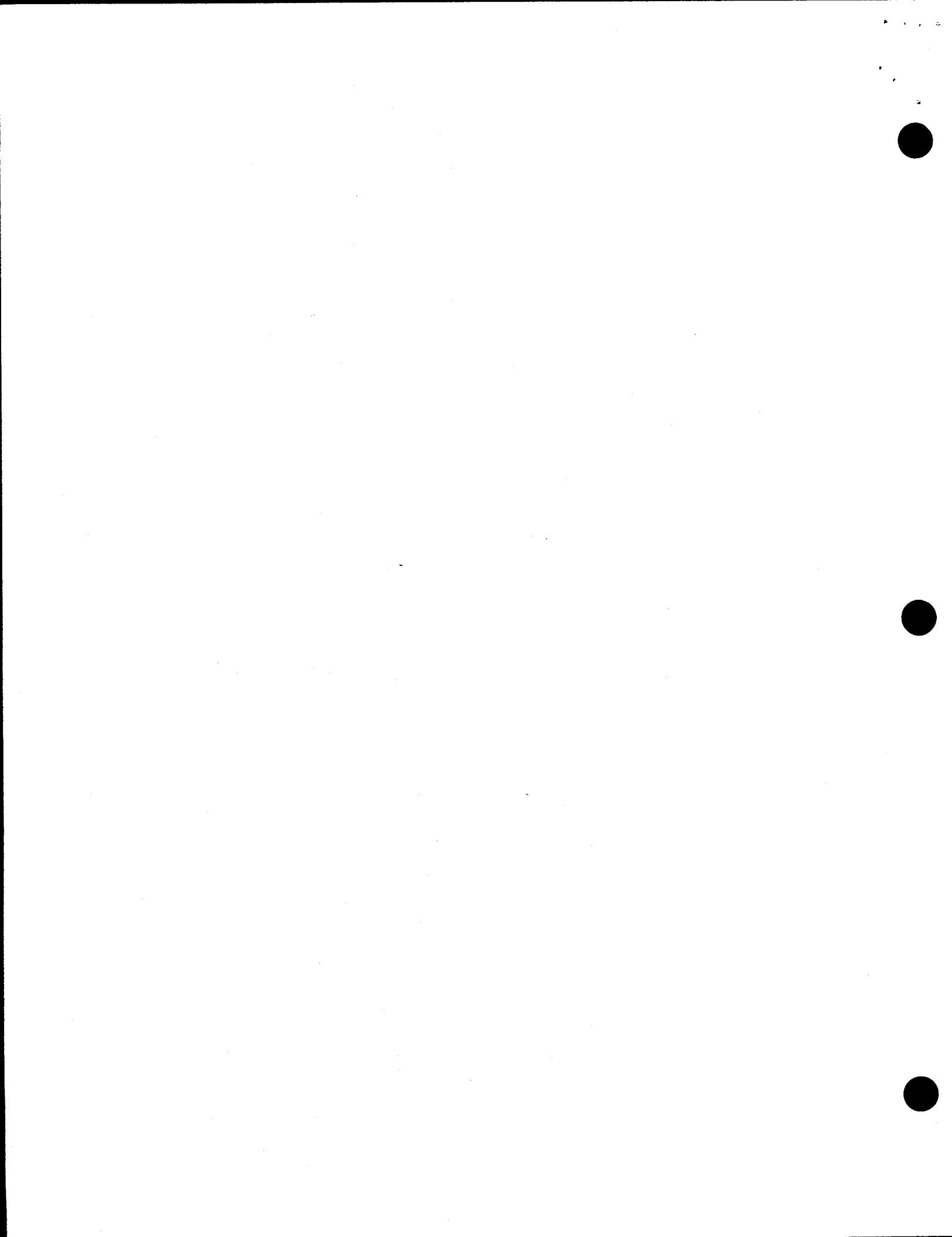
^a Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

^bThe bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3
ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity ^a (Curies)
HRLAL	2026	0.26
Central Radioactive Gas Disposal Facilities	3039	0.89
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		1.15

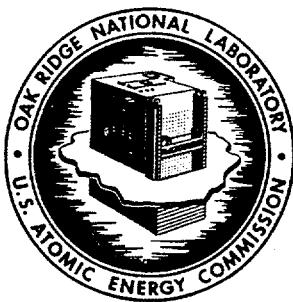
^aActivity primarily ^{131}I as noted in text.



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LIQUID WASTE

Release to Clinch River

The concentration of radioactivity in the river resulting from ORNL waste discharges was 0.25% of the MPC_W for a release to an uncontrolled area. Strontium, tritium, and iodine were the main contaminants, accounting for 81.3%, 12.3%, and 2.9%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 is a list of the amounts of radioactivity released into White Oak Creek. A monthly comparison of the strontium activity released to the creek is shown in Figure 2.

Process Waste

A total of 6.6 million gallons of contaminated water was chemically treated this month. Gross beta analyses of the inlet and outlet streams indicated that 88% of the radioactivity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system, and Figure 4 compares the volumes of waste handled each month.

The discharges of radioactivity from the process waste system to the creek, as given in Figure 3 and Table 1, are based on analyses of samples taken with the old trebler sampler which was reactivated after being out of service for many years. A study recently completed of the sampling equipment and techniques used during the last several years revealed that

the equipment and techniques were faulty and that the discharges that have been reported in previous reports were low.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 221 gph. A summary of operating data is listed below:

	<u>Gallons</u>
Total volume generated	209,000
Volume transferred to evaporator	164,000
Tank farm free space at beginning of month	463,000
Tank farm free space at end of month	412,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	72,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	29,000
4500 Complex	27,000
Fission Products Development Laboratory	26,000
ORR and BSR	19,000
High Flux Isotope Reactor	18,000
Radioisotopes Processing Area	17,000

Gaseous Waste

The ORNL stacks discharged 30 millicuries of ^{131}I this month. The alpha and beta-gamma particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 2.3% and 0.1%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

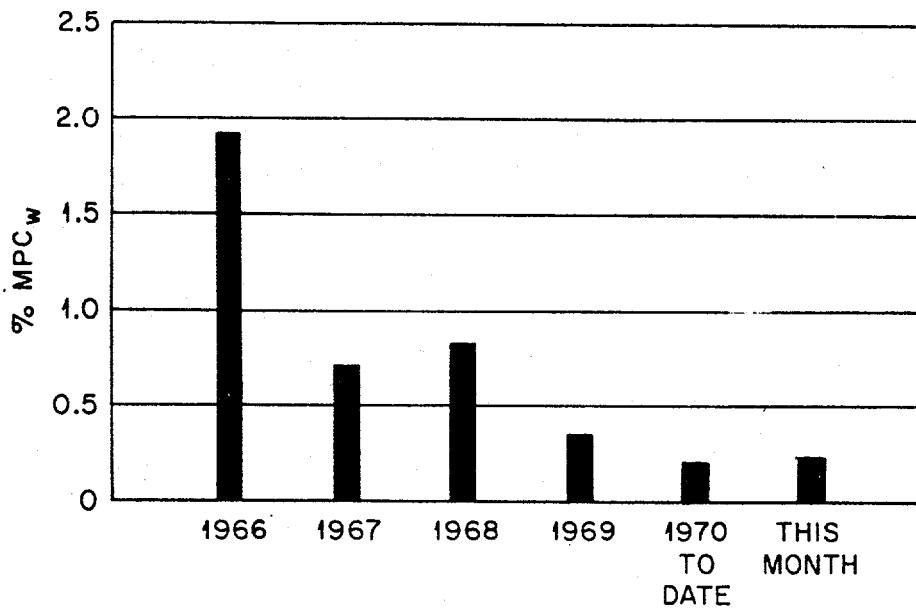


Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

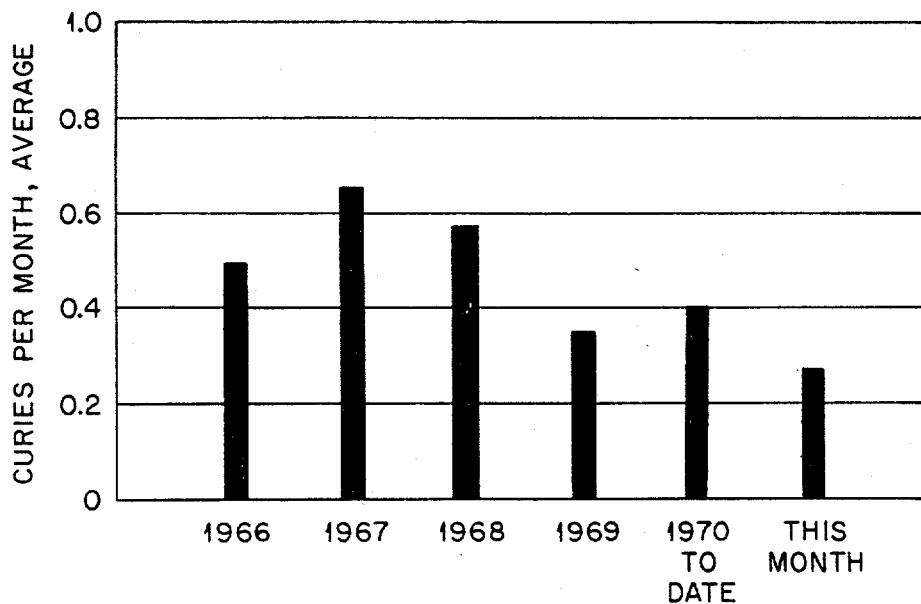


Fig. 2. Total ⁸⁹Sr and ⁹⁰Sr Released to White Oak Lake as
Measured at Sampling Stations 3 and 4 (See Fig. 7).

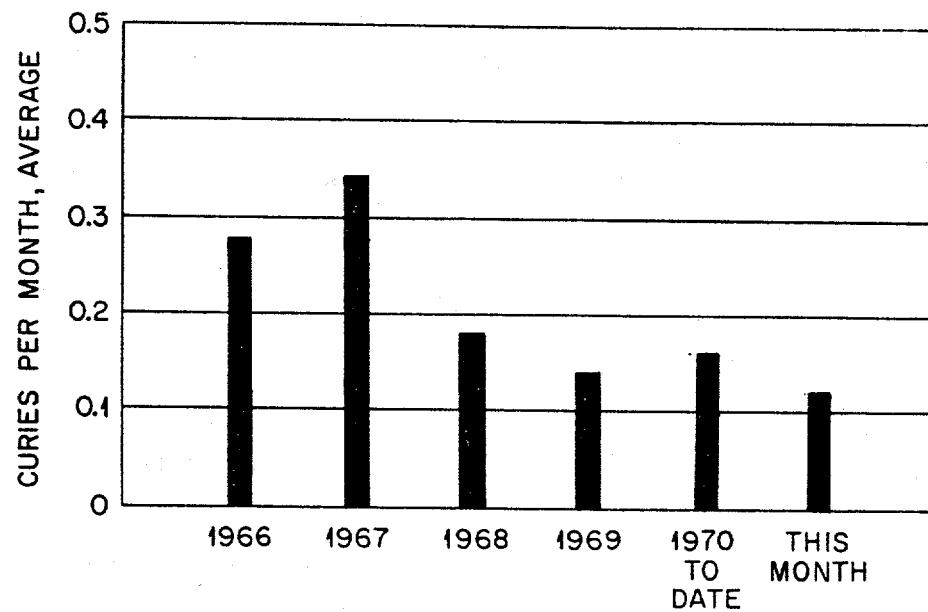


Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

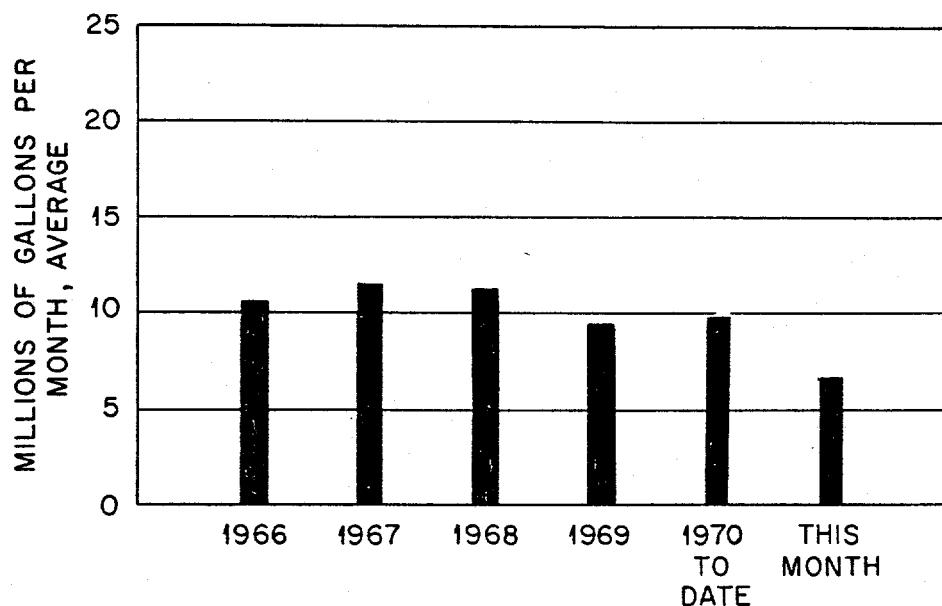


Fig. 4. Process Waste Volumes.

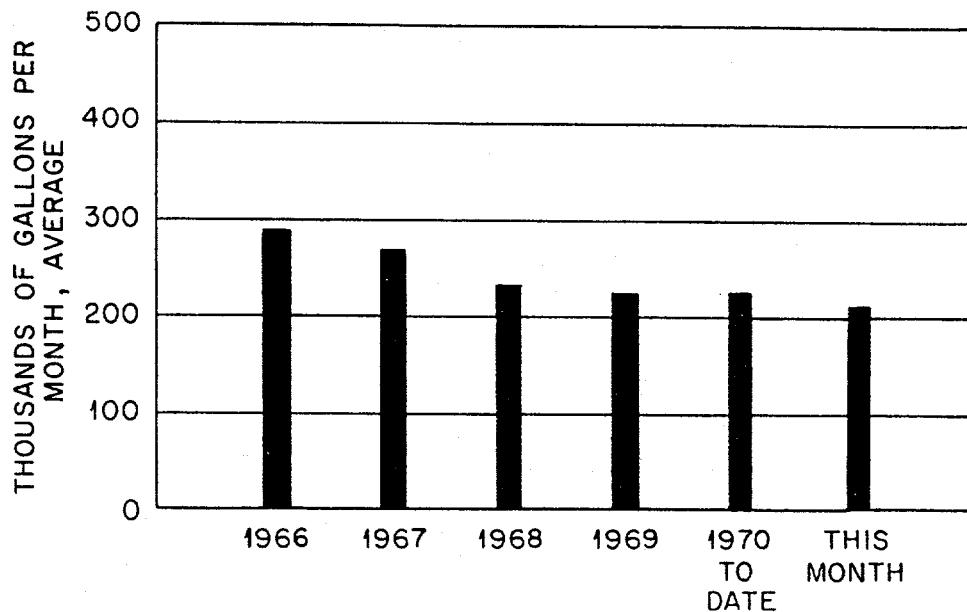


Fig. 5. Intermediate—Level Waste Volumes.

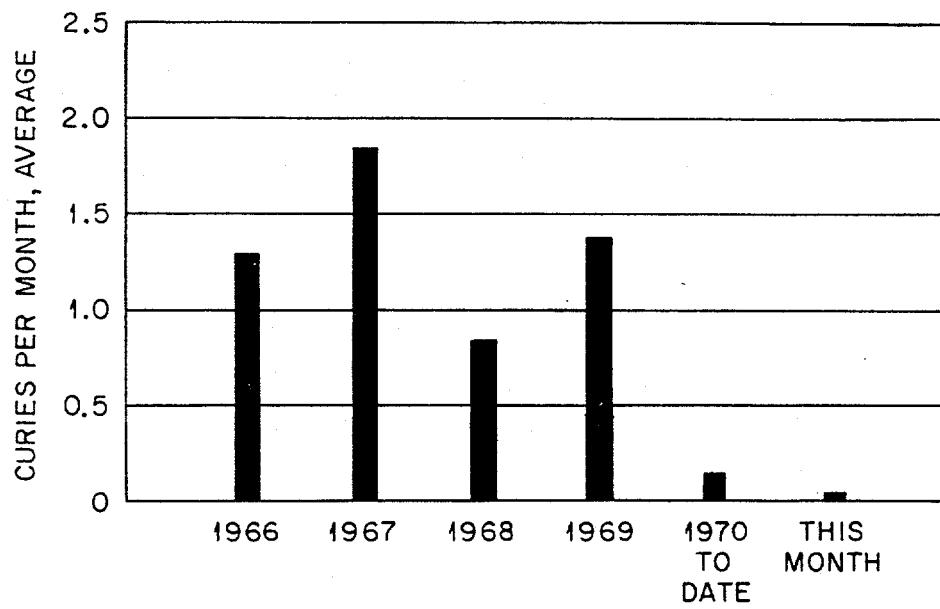


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ;
Does not include Rare Gases or Other Non-adsorbable Species). ORNL's
Maximum Permissible Operating Level is 13 curies Per Quarter.

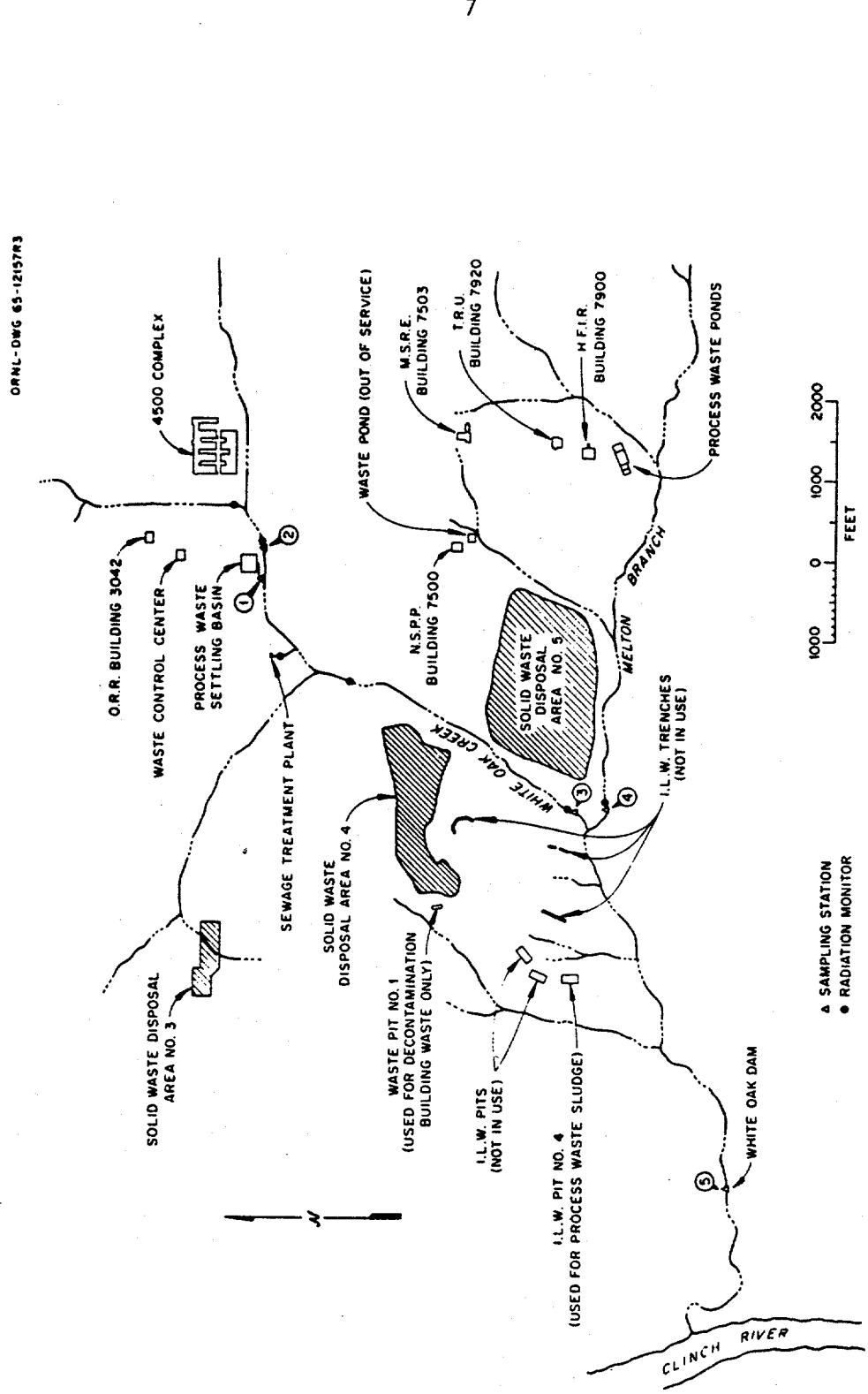


Fig. 7. Location Plan for White Oak Sampling Stations and Radiation Monitors.

TABLE 1
ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta Curies ^b
Process waste	1	0.12	0.30
Miscellaneous discharges from east end of plant	2	0.03	0.04
Discharge from Bethel Valley Area	3	0.23	0.50
Discharge from Melton Valley Area	4	0.04	0.08
Total discharge from all sources	3,4	0.27	0.58
White Oak Dam to Clinch River	5	0.25	0.68

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2
PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity ^a		% of Million Gallons Total	% of Total
		Curies	Total		
1. Reactor Operations	70 ^b	0.99 ^b	70.2	2.05	37.5
2. Radioisotope Processing Area	109	0.35	24.9	0.47	8.6
3. Buildings 3503 and 3508	9	0.04	2.8	0.58	10.6
4. Buildings 3025 and 3026	<1	<0.01	--	0.67	12.2
5. Building 3019	6	<0.01	--	0.07	1.3
6. Fission Products Development Laboratory	46	0.02	1.4	0.03	0.5
7. Waste Evaporator, Building 2531	2	0.01	0.7	0.72	13.2
8. Buildings 3525 and 3550	<1	<0.01	--	0.75	13.7
9. Building 2026	<1	<0.01	--	0.13	2.4

^a Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

^b The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

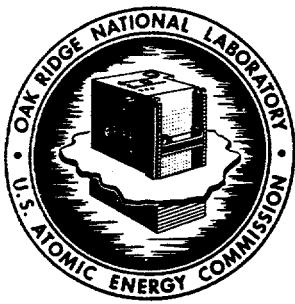
TABLE 3
ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity ^a (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.03
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.03

^aActivity primarily ^{131}I as noted in text.

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.01	≤ 0.06
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.16	0.33
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.07	0.12
Total discharge from all sources	3,4	0.23	0.45
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.29

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .



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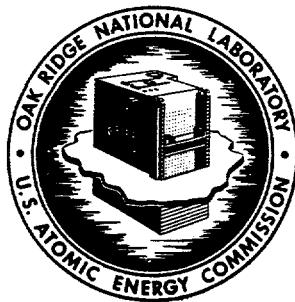
Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.18	0.378
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	(\leq) 0.02	(\leq) 0.05
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.24	0.49
Total discharge from all sources	4,5	0.03 0.27	0.07 0.56
White Oak Dam to Clinch River (Health Physics measurement)	5	0.19	0.75

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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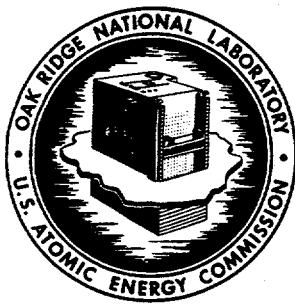
Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.007	≤ 0.121
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	$0.41 \frac{27}{74}$	0.66
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.10	0.162
Total discharge from all sources	3,4	0.51	0.822
White Oak Dam to Clinch River (Health Physics measurement)	5	0.36	1.34

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Numbera	Total Sr, Curies	Gross Beta, Curriesb
Miscellaneous discharges from east end of plant	2	< 0.011	0.230
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.862 314 --- 41	2.493
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.056	0.220
Total discharge from all sources	3,4	0.918	2.713
White Oak Dam to Clinch River (Health Physics measurement)	5	0.79	0.93

a Refers to Fig. 7.

b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/41

DATE: January 26, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1975

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David R. Hanna 3/4/96
Technical Information Officer Date
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.30	0.480
Miscellaneous discharges from east end of plant	2	0.01	0.07
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.72	1.69
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.03	0.06
Total discharge from all sources	3,4	0.75	1.75
White Oak Dam to Clinch River (Health Physics measurement)	5	0.41	0.47

^a Refers to Fig. 7.

^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-76/49

DATE: February 4, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1975

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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David C. Hartman 3/4/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.01	0.15
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.98 98% 5%	2.09
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.01	0.14
Total discharge from all sources	3,4	0.99	2.23
White Oak Dam to Clinch River (Health Physics measurement)	5	0.44	0.51

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/99

DATE: March 19, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.68	0.94
Miscellaneous discharges, from east end of plant	2	0.17	0.35
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.61	2.40
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.14	0.24
Total discharge from all sources	3,4	1.75	2.64
White Oak Dam to Clinch River (Health Physics measurement)	5	1.18	1.33 ^c

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-76/124

DATE: April 19, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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David C. Hamm 3/1/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.04	0.17
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.79	1.60
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.11	0.31
Total discharge from all sources	3,4	0.90	1.91
White Oak Dam to Clinch River (Health Physics measurement)	5	0.55	0.62

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/135

DATE: May 7, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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David L. Hamlin 3/4/96
Technical Information Officer
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.26	0.59
Miscellaneous discharges from east end of plant	2	< 0.06	< 0.55
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.07	1.92
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.12
Total discharge from all sources	3,4	1.15	2.04
White Oak Dam to Clinch River (Health Physics measurement)	5	0.52	0.64

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-76/166

DATE: June 15, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of April, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Daniel H. Hamm 3/4/96

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.057 ^c	0.10
Miscellaneous discharges from east end of plant	2	≤ 0.019	< 0.062
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.44	0.78
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.064	0.13
Total discharge from all sources	3,4	0.50	0.91
White Oak Dam to Clinch River (Health Physics measurement)	5	0.52	0.66

a Refers to Fig. 7.

b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .c This represents the release from the Settling Basin with the new Process Waste Treatment Plant contributing only 0.003 curies of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-76/195

DATE: July 6, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of May, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David R. Hinman 3/4/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross-Beta, Curies ^b
Process Waste	1	0.06 ^c	0.09
Miscellaneous discharges from east end of plant	2	0.016	< 0.14
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.53	0.99
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.062	0.14
Total discharge from all sources	3,4	0.59	1.13
White Oak Dam to Clinch River (Health Physics measurement)	5	0.38	0.48

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

^cThis represents the release from the Settling Basin with the new Process Waste Treatment Plant contributing only 0.0001 curies of ^{90}Sr .

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ORNL/CF-76/295

DATE: August 2, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.004 ^c	0.0078
Miscellaneous discharges from east end of plant	2	0.006	0.073
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.388	0.519
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.047	0.081
Total discharge from all sources	3,4	0.435	0.600
White Oak Dam to Clinch River (Health Physics measurement)	5	0.27	0.340

^aRefers to Fig. 7.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.^cThis represents the release from the settling basin with the new Process Waste Treatment contributing only 0.0002 curies of 90Sr.

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ORNL/CF-76/338

DATE: August 30, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of July, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0024	0.006
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.006	0.21
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.21	0.96
Total discharge from all sources	4	0.025	0.11
White Oak Dam to Clinch River (Health Physics measurement)	3,4	0.24	1.07
	5	0.24	0.44

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/363

DATE: October 13, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David R. Hinman 3/4/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0004	0.025
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.0066	0.060
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.20	0.42
Total discharge from all sources	4	0.021	0.042
White Oak Dam to Clinch River (Health Physics measurement)	5	0.07	0.11

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/419

DATE: November 16, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David C. Hamlin 11/96

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0003	0.021
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.019	\leq 0.078
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.12	0.29
Total discharge from all sources	4	0.008	0.06
White Oak Dam to Clinch River (Health Physics measurement)	3,4	0.13	0.35
	5	0.11	0.16

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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DATE: November 16, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.0003	0.021
Miscellaneous discharges from east end of plant	2	0.019	≤ 0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.29
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.008	0.06
Total discharge from all sources	3,4	0.13	0.35
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.16

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-76/441

DATE: December 15, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released In Liquid Wastes to White Oak Creek

Process Waste	Monitoring			Gross Beta, Curies ^b
	Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b	
	N	D		
Miscellaneous discharges from east end of plant	1	0.01	0.0002	0.05
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.01	0.02	0.049*
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.24	0.26	0.22
Total discharge from all sources	4	0.3	0.3	0.053
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.19	0.31

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

* This is higher than normal. A subsequent sample indicates a return to normal levels.

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ORNL/CF-76/463

DATE: December 29, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David R. Harmon 3/4/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0019	0.062
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.013	0.14
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.24	0.64
Total discharge from all sources	4	0.026	0.062
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.26

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-77/65

DATE: February 23, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
to the public by:

David R. Hamm 3/4/96
Technical Information Officer
ORNL Site

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross-Beta, Curies ^b
Process Waste	1	0.0012	0.053
Miscellaneous discharges from east end of plant	2	0.024	0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.26	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5.	4	0.033	0.092
Total discharge from all sources	3,4	0.29	0.89
White Oak Dam to Clinch River (Health Physics measurement)	5	0.30	0.41

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

ORNL/CF-77/89

DATE: February 27, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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Daniel C. Hartman 2/4/96
Technical Information Officer Date
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross-Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0035	0.0060
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.0145	0.056
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.238	0.553
Total discharge from all sources	4	0.029	0.079
White Oak Dam to Clinch River (Health Physics measurement)	5	0.267	0.632
		0.22	0.31

^aRefers to Fig. 7.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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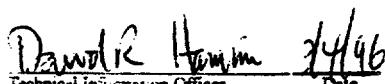
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ORNL/CF-77/187

DATE: March 24, 1977
SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1977
TO: Distribution
FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David R. Hargan 3/4/96
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
L-4 Process Waste	1	0.0012	0.034
F1 Miscellaneous discharges from east end of plant	2	0.011	0.021
WOC Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.208	0.420
MB Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.043	0.113
Total discharge from all sources	3,4	0.251	0.533
HP White Oak Dam to Clinch River (Health Physics measurement)	5	0.15	0.24

^a Refers to Fig. 7.^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-77/301

DATE: May 9, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0008	0.03
Discharge from Bechtel Valley Operations and Burial Ground No. 4	2	0.018	0.46
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.25	0.84
Total discharge from all sources	3,4	0.31	1.05
White Oak Dam to Clinch River (Health Physics measurement)	5	0.24	0.36

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-77/322

DATE: June 8, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.01	0.02
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.02	0.07
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.20	0.41
Total discharge from all sources	3,4	0.06 0.26	0.18 0.59
White Oak Dam to Clinch River (Health Physics measurement)	5	0.51	0.67

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-77/341

DATE: July 12, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.0003	0.033
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.017	0.28
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.17	0.22
Total discharge from all sources	4	0.03	0.04
White Oak Dam to Clinch River (Health Physics measurement)	5	0.10	0.13

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.

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ORNL/CF-77/383

DATE: August 10, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of June, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies ^b	Gross Beta, Curies ^b
Process Waste	1	0.035	0.064
Miscellaneous discharges from east end of plant	2	0.046	0.083
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.353	1.066
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.023	0.078
Total discharge from all sources	3,4	0.376	1.144
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.35

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr.

10
 0.635
 0.346
 0.181
 0.072
 0.031
 0.012
 0.002

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ORNL/CF-77/395

DATE: September 6, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of July, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross-Beta, Curies ^b
Process Waste	1	0.02	0.08
Miscellaneous discharges from east end of plant	2	0.01	0.02
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.23	0.42
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.06	0.18
Total discharge from all sources	3,4	0.29	0.60
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.13

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

DATE ISSUED OCT 25 1977

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ORNL/CF-77/434

DATE: October 18, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1977.

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Daniel R. Harron 1/12/96
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RADIOACTIVE EFFLUENTS
Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1977, was 0.14% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.12% MPC_W and 0.01% MPC_W, respectively. These values represent 0.10 Ci of ⁹⁰Sr and 84 Ci of ³H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.27 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the System are listed in Table 2.

The Process Waste Treatment Plant improved in strontium removal over last month with an efficiency of 98.14%. However, this is still below the normal strontium removal efficiency of >99%.

Process Waste Treatment Plant - Bldg. 3544

<u>Ion Exchange Column Operating Data</u>			
Run No.	Column	Run Time	Bed Volumes
81	C	121 hrs	1926
82	A	119 hrs	1796
83	B	166 hrs	1933
84	C	178 hrs	1896
85	A	148 hrs	1965

Two existing feed pumps were replaced with higher capacity units. The existing feed pumps did not meet design flow requirements of 2000 gpm.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 146.5 gph.

	<u>Gallons</u>
Total volume generated	104,000
Volume transferred to evaporator	109,000
Tank Farm free space at beginning of month	367,000
Tank Farm free space at end of month	369,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	119,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	10,500
Fission Products Development Laboratory	1,800*
ORR and BSR	14,800
High Flux Isotope Reactor	25,600
Radioisotopes Processing Area	8,600
4500 Complex	13,600
Transuranium Processing Area	1,800

* Storage tank pit has a water in-leakage problem from groundwater. This represents the volume jetted from the storage tank pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL stacks discharged 220 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to $177\mu\text{Ci}$.

Inert gases released from the 3039 and 7911 stacks averaged less than 0.8% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The increased ¹³¹I release was primarily due to a charcoal filter-pit problem which was corrected during the month.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen was exceeded in two of four samples at the main plant.
2. The chlorine residual limit was exceeded in one of ninety-three samples at the main plant.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, White Oak Dam and at a point in the Clinch River upstream from where White Oak Creek empties into the river.

Maintenance and Corrective Action

During the shakedown of the neutralization plant (Bldg. 3518), one of the two transite baffle plates which separate the surge basin from the neutralization basin collapsed, thus making the plant inoperable. These were the original baffles used in the operation of the old Process Waste Treatment Plant. The reason for the failure was the differential water head placed across the baffles. This condition did not exist in the original plant and apparently was not considered when the facility was converted to a pH neutralization plant. The transite baffles will be replaced with 3/4" steel plates.

The plant is now scheduled for startup in October pending the completion of the above repairs.

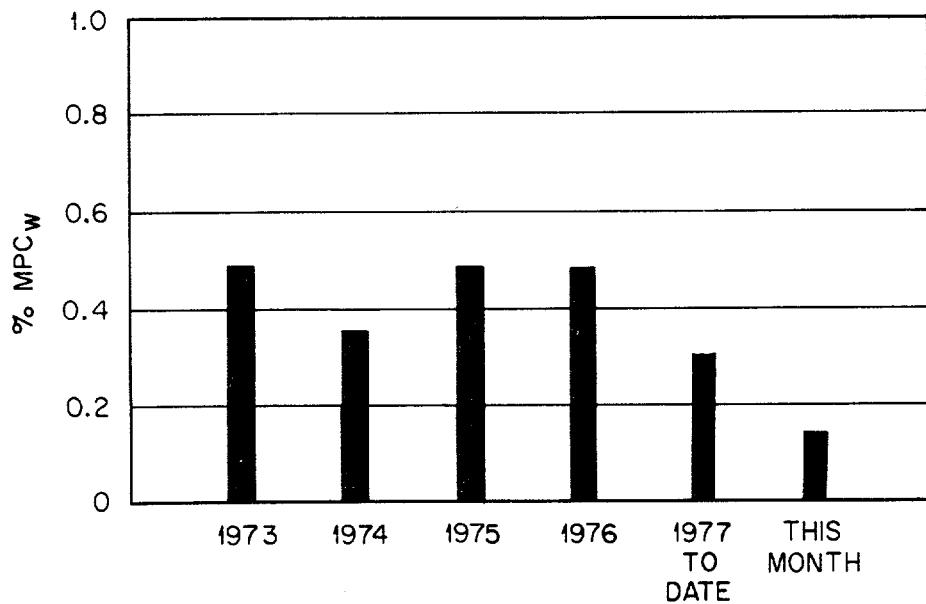


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

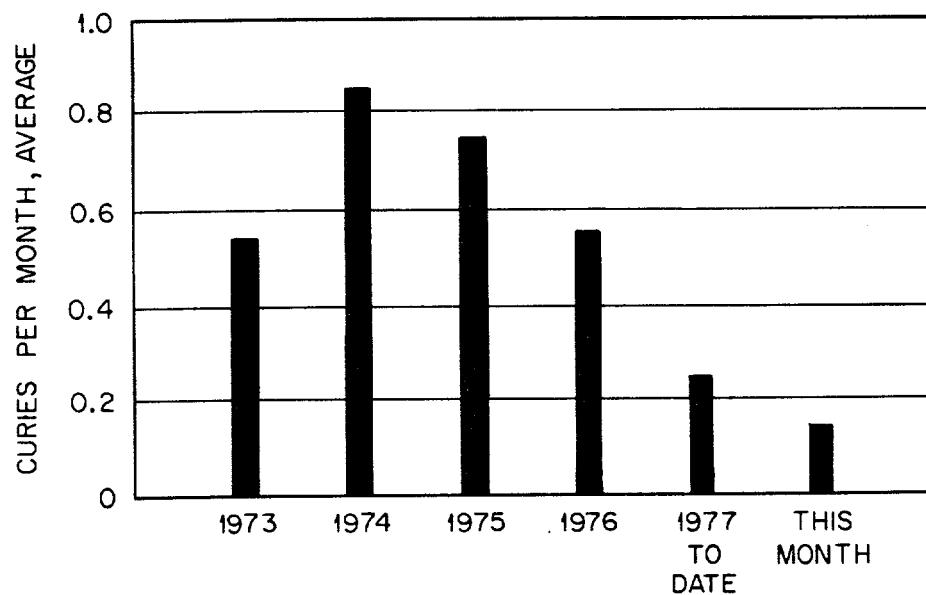


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

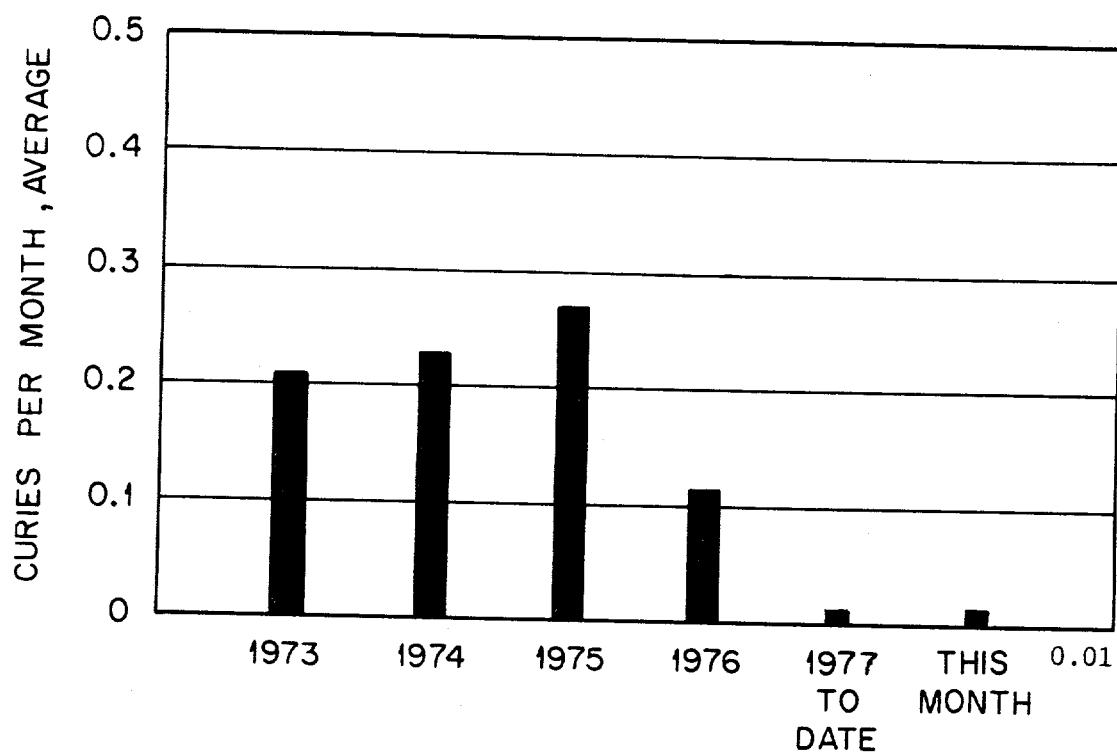


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

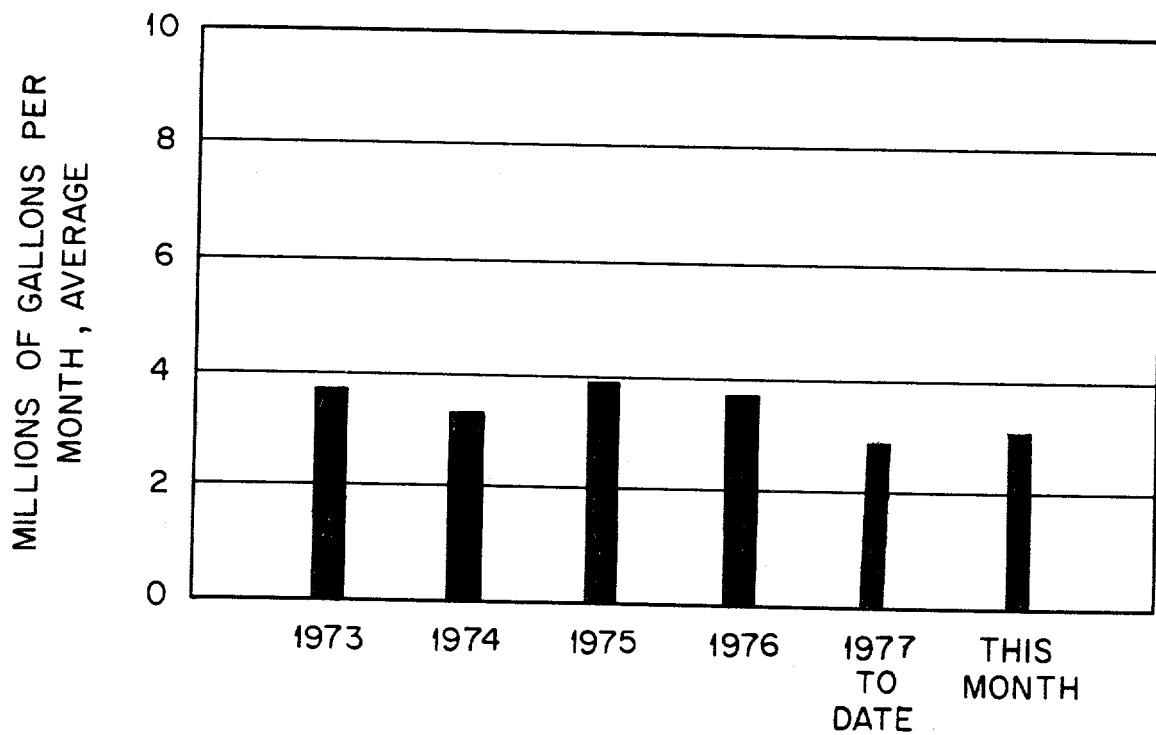


Fig 4. Process Waste Volumes.

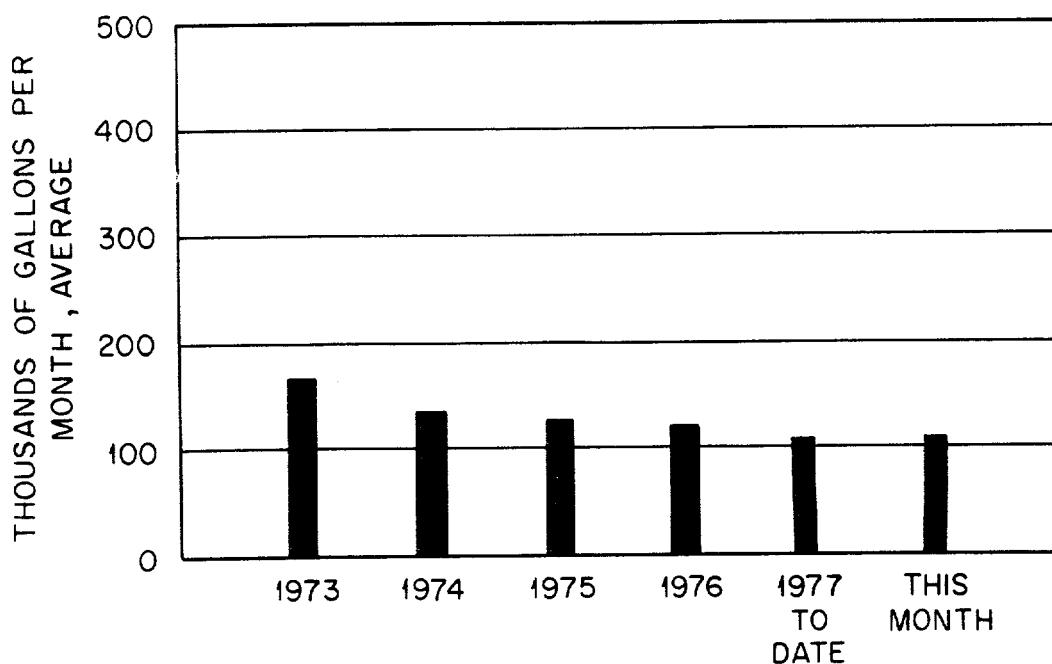


Fig 5. Intermediate - Level Waste Volumes.

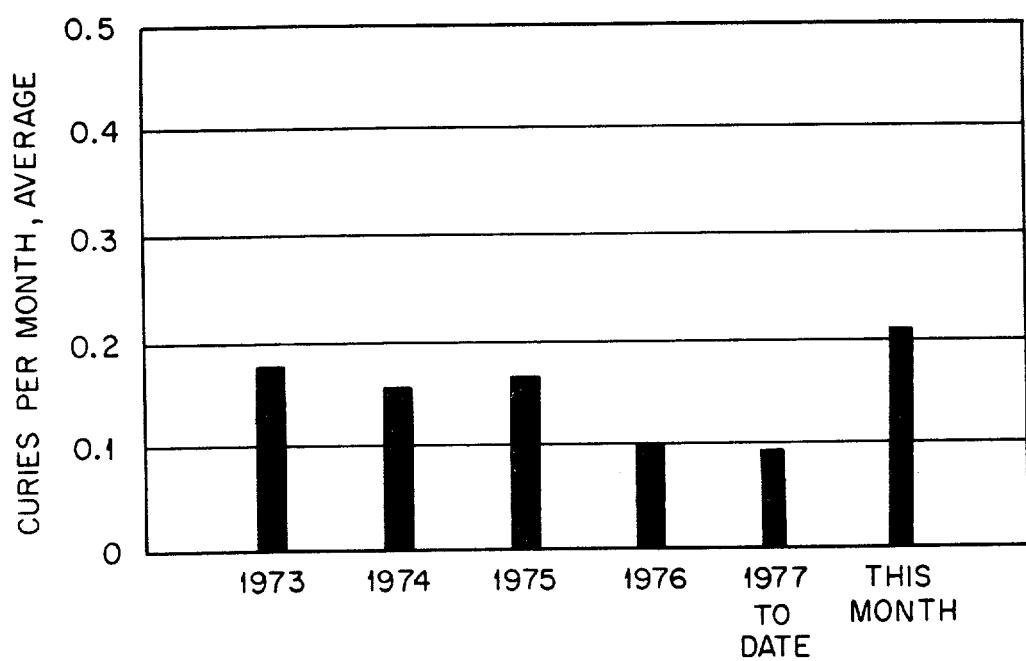


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

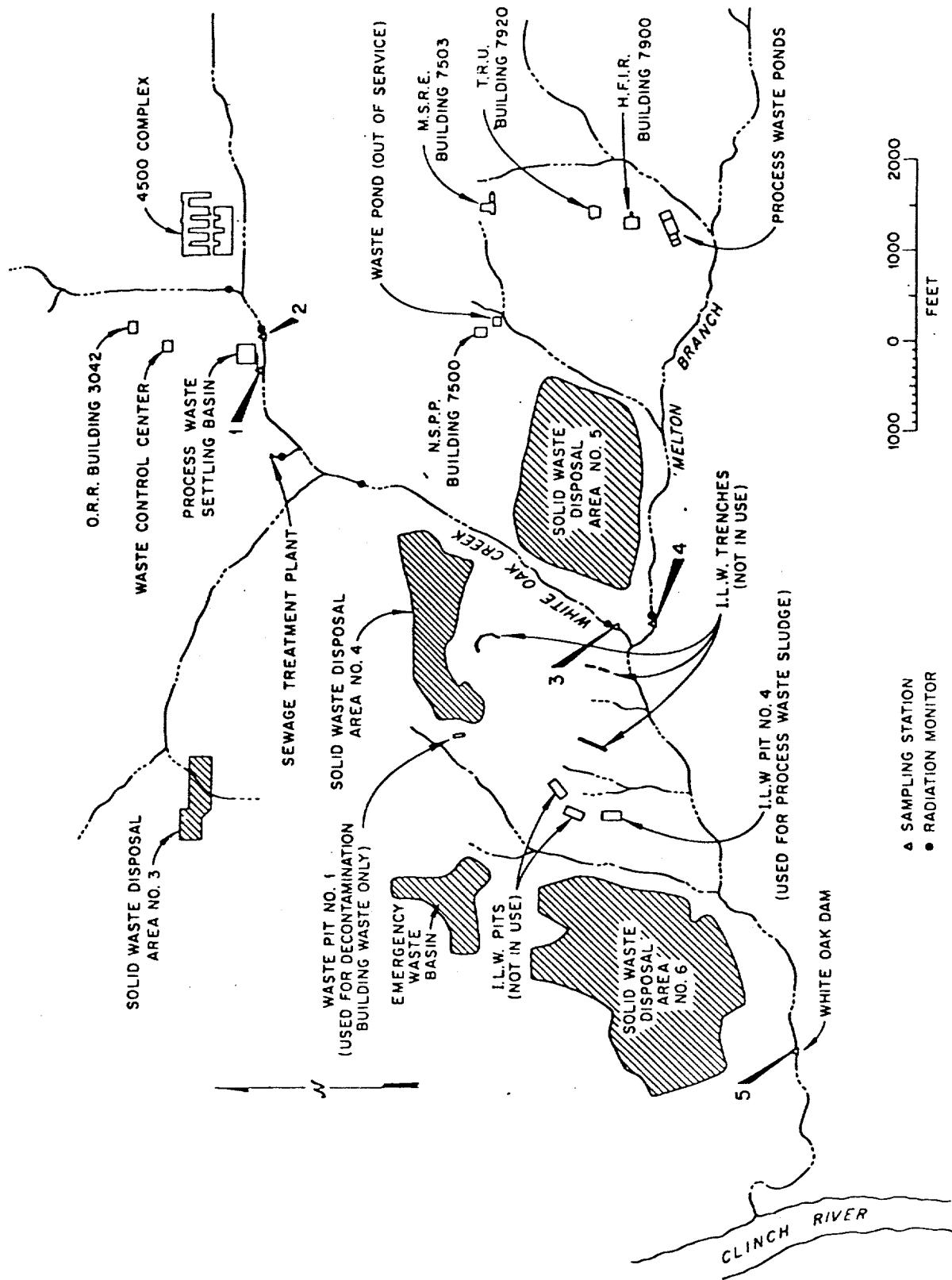


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.01	0.06
Miscellaneous discharges from east end of plant	2	0.02	0.05
Discharge from Bethel Valley Operations and Burial			
Ground No. 4	3	0.13	0.30
Discharge from Melton Valley Operations and Burial			
Ground No. 5	4	0.01	0.06
Total discharge from all sources	3,4	0.14	0.36
White Oak Dam to Clinch River (Health Physics measurement)	5	0.10	0.12

^aRefers to Figure 7

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m/ml ^a	Gross-Beta		Volume Million Gallons	% of Total
		Curies ^b	% of Total		
1. Radioisotopes Processing					
Area (MH234)	42.4	0.01	1.25	0.03	1.01
2. Radioisotopes Processing					
Area (MH114 minus MH 112)		0.33 ^c	41.25	0.62	20.87
3. Reactor Operations (MH112)	0.81	<.01		0.52	17.51
4. Buildings 3503 and 3508	5.3	<.01		0.05	1.68
5. Buildings 3025 and 3026	2.0	<.01		0.41	13.80
6. Building 3019	5.4	<.01		0.17	5.72
7. Waste Evaporator, Bldg. 2531	13.5	0.02	2.50	0.28	9.43
8. Building 3525	0.11	<.01		0.10	3.37
9. Building 2026	1.8	<.01		0.10	3.37
10. Tank Farm Drainage	1.2	0.44	55.00	0.69	23.23

^aCounted at 30% geometry.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ⁹⁰Sr.^cThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HLAL	2026	<0.01	-
Central Radioactive Gas Disposal Facilities	3039	<u><0.22</u>	159.0
Radiochemical-Processing Pilot Plant	3020	<0.01	1.0
MSRE	7512	-	-
HFIR & TRU	7911	<0.01	17.0
Total Activity in Gases Released at X-10 Site		<u><0.22</u>	177.0
Chem. Tech. Division - Y-12 Area		0.4	
Tritium Target Fabrication Building		0.7	
Building 4508 Ventilation Discharges			
Room 136		3.2×10^{-4}	
Room 265		7.0×10^{-5}	
Building 5505 Discharges			
Glove Box		7.8×10^{-3}	
Hood		4.5×10^{-4}	

^aActivity primarily ^{131}I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard ^a ppm	Sample Point ^b			Clinch River
		3	4	5	
Cr	0.05	<0.01	<0.01	0.004	<0.00001
Zn	0.1	0.003	0.007	0.0006	0.00008
P	1	0.24	0.68	0.14	0.015
NO ₃ (as N)	10	0.79	0.39	0.73	0.17
Hg	0.005	0.002	c	<0.0001	<0.00001

^aTennessee water quality criteria for fish and aquatic life.

^bRefer to Figure 7. The Clinch River samples were taken upstream from the point where White Oak Creek enters the river.

^cThis analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL/CF-77/454

DATE: November 8, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring
Report for the Month of September, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
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David C. Harrington 3/4/96
Technical Information Officer Date
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.002	0.07
Miscellaneous discharges from east end of plant	2	0.02	0.05
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.15	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.07
Total discharge from all sources	3,4	0.17	0.87
White Oak Dam to Clinch River (Health Physics measurement)	5	0.21	0.25

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-78/7

DATE: January 6, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1977

TO: Distribution

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David A. Hamlin 34495
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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.001	0.0006, 0.096
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.012	0.012
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.179	0.166
Total discharge from all sources	4	0.191	0.04
White Oak Dam to Clinch River (Health Physics measurement)	5	0.249	0.20
		0.17	0.20

^aRefers to Figure 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-78/17

DATE: January 18, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1977

TO: Distribution

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies ^a	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	2	0.025	0.12
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.58	0.75
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.06	0.08
Total discharge from all sources	3,4	0.64	0.83
White Oak Dam to Clinch River (Health Physics measurement)	5	0.38	0.49

aRefers to Fig. 7.

bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of 90Sr .

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ORNL/CF-78/48

DATE: January 31, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1977

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

This document has been approved for release
to the public by:

David R. Haslam 3/4/96
Technical Information Officer Date

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.001	0.05
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.01	0.040
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.20	0.53
Total discharge from all sources	4	0.050	0.16
White Oak Dam to Clinch River (Health Physics measurement)	3,4	0.250	0.68
	5	0.27	0.34

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-78/65

DATE: March 10, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1978

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, ^b Curies
Process Waste	1	0.001	0.005
Miscellaneous discharges from east end of plant	2	0.02	0.28
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.24	0.66
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.07	0.14
Total discharge from all sources	3,4	0.31	0.80
White Oak Dam to Clinch River (Health Physics measurement)	5	0.36	0.46

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

CF-78/191

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SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1978

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

Process Waste	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Miscellaneous discharges from east end of plant	1	0.001	0.014
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.014	0.053
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.145	0.319
Total discharge from all sources	4	0.035	0.080
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.14

^a Refers to Fig. 7.^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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CENTRAL FILES NUMBER

CF-78/193

DATE: May 11, 1978

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TO: Distribution

FROM: L. C. Lasher

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number	Total Sr, Curies	Gross Beta ^b , Curies
Process Waste			
Miscellaneous discharges from east end of plant	1	0.013	0.015
Discharge from Bethel Valley Operations and Burial Ground No. 4	2	0.0497	<0.052
Discharge from Melton Valley Operations and Burial Ground No. 5	3	0.183	0.576
Total discharge from all sources	4	0.062	0.161
White Oak Dam to Clinch River (Health Physics measurement)	5	0.245	0.737
		0.21	0.30

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-78/204

DATE: May 30, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1978

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FROM: L. C. Lasher

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1978, was 0.22% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.13% MPC_W and 0.05% MPC_W, respectively. These values represent 0.11 Ci of ⁹⁰Sr and 440 Ci of ³H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The April flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 255.7 and 43.3 million gallons, respectively.

Although the flow from the White Oak Creek watershed diminished during the period (-33%), the strontium released into White Oak Lake remained the same as that measured last month. This was caused by an increase (14 mCi) in the amount of strontium activity released from the Process Waste System.

While investigating ⁹⁰Sr in White Oak Creek between Stations 2 and 3, during December, 1977, personnel from the Environmental Sciences Division found that some strontium has been released into the creek from the MH-190 Waste Pond System and the Sanitary Waste System. They indicated that 51 mCi were discharged from the Waste Ponds and 72 mCi were discharged from the Sanitary Treatment Plant (STP).

When it was learned that ⁹⁰Sr was being discharged to White Oak Creek from the MH-190 Waste Ponds, drainage from the 3503 tank farm area was im-

mediately diverted from MH-190 to the Equalization Basin. This drainage was apparently the source of the activity from the Waste Ponds. Composite sampling by the Environmental Sciences personnel at the discharge of the Waste Ponds for the weeks of 4/17 - 4/21 and 4/24 - 4/28 indicated that the dpm/ml of ^{90}Sr dropped from 0.80 to 0.10 for the two periods sampled. The April composite for MH-190 analyzed 1.5 dpm/ml which represents a discharge of 16 mCi and composite sampling during the period 5/1 - 5/7 for the 4507 and 4500 tributaries indicated ^{90}Sr concentrations of 0.23 and 0.50 dpm/ml. Assuming the higher concentration and the total flow for this period, this would represent 5.6 mCi/month of ^{90}Sr .

To locate the source of the strontium in the Sanitary Waste System, additional rad monitors have been installed in several tributaries and a composite sampling program initiated. Samples by Environmental Sciences personnel at the STP discharge pipe in the creek gave the following results:

	<u>dpm/ml</u>	<u>mCi/month</u>
4/3 - 4/7	1.1	9.9
4/10 - 4/14	1.1	12.0
4/17 - 4/21	1.1	15.4
4/24 - 4/28	1.1	12.4

A composite sample of the STP effluent for the period 4/17 - 4/21 analyzed 1.0 dpm/ml which corresponds to a discharge of 12.2 mCi/month. None of the April samples indicated the amounts reported from the December samples.

Sampling and monitor placements in various tributaries of the sewage system indicate that this leakage is occurring at or near the lift station in the section of sewer line on Central Avenue that was modified about 1972 because of inleakage of radioactive waste. The leak has been patched and does not appear to be leaking now. However, this is considered a temporary

measure and permanent repairs will be made when we are positive that this is the leak.

Process Waste

A total of 3.16 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

Two operating problems were encountered at the Process Waste Treatment Plant during the period:

1. About 3 cubic feet of resin were flushed from column L-4B into catch basin L-5 when the 60 mesh wire cloth covering which contains the resin came off of the flow distributor head. The column was removed from service and emptied. It will be reloaded with new resin when the distributor head is repaired.

2. The softening process (precipitator-clarifier) deteriorated during the latter part of the month probably as a result of a change in the chemistry of the feed water. The ion exchange system was subjected to a high hardness loading which adversely affected the removal of radioactivity from the water.

A brief summary of plant operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time	Bed Volumes
130	B	152 Hrs	1960
131	C	184 "	1965
132	A	168 "	1969
133	B*	150 "	1664
134	C	94 "	1180

* Lost 2 wire cloth covers from the distributor head and approximately 3 cubic feet of resin were flushed into the clear well.

Intermediate-Level Waste

The waste evaporator operated at an average boildown rate of 133 gph.

	<u>Gallons</u>
Total volume generated	84,000
Volume transferred to evaporator	96,000
Tank Farm free space at beginning of month	356,000
Tank Farm free space at end of month	366,000
Evaporator concentrate returned to tank farm	2,000
Volume of concentrate available for hydrofracture	106,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
Building 3019	9,200
Fission Products Development Laboratory	2,400*
ORR and BSR	17,600
High Flux Isotope Reactor	13,900
Radioisotopes Processing Area	7,200
4500 Complex	4,300
Transuranium Processing Area	1,200

GASEOUS WASTE

The ORNL stacks discharged 108 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 364 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 0.9%

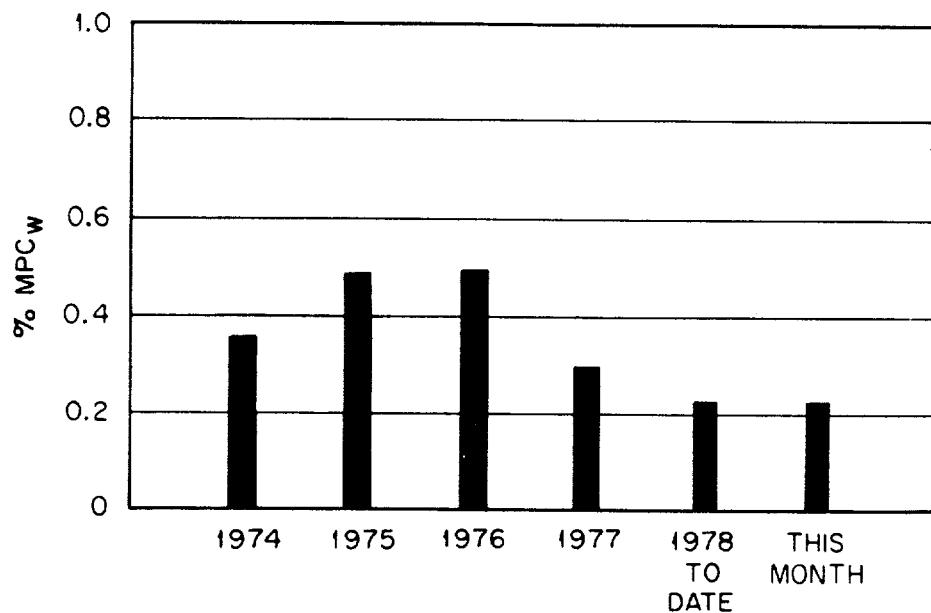
* The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

Unusual Occurrences

1. Two sections of 60 mesh wire cloth installed on the column flow distributor to contain the ion exchange media came loose and about 3 cubic feet of resin were washed from column L-4B into clear well L-5. After repairing the distributor header, the column will be reloaded with new sand and resin.
2. The 54 square inch concrete cell ventilation duct which serves Buildings 3525, 3517, 2531, and the South Tank Farm was broken in two places by a pneumatic pavement breaker operated by a contractor who was installing conduit for the new communications system. There was no disruption of service and temporary repairs were made without incident.
3. The abandoned 2" cast iron waste transfer line was broken at a point east of Building 2531 by the communications construction group during trenching operations. The line was repaired with an Adam's clamp.

ORNL-DWG 75-2539R3



Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

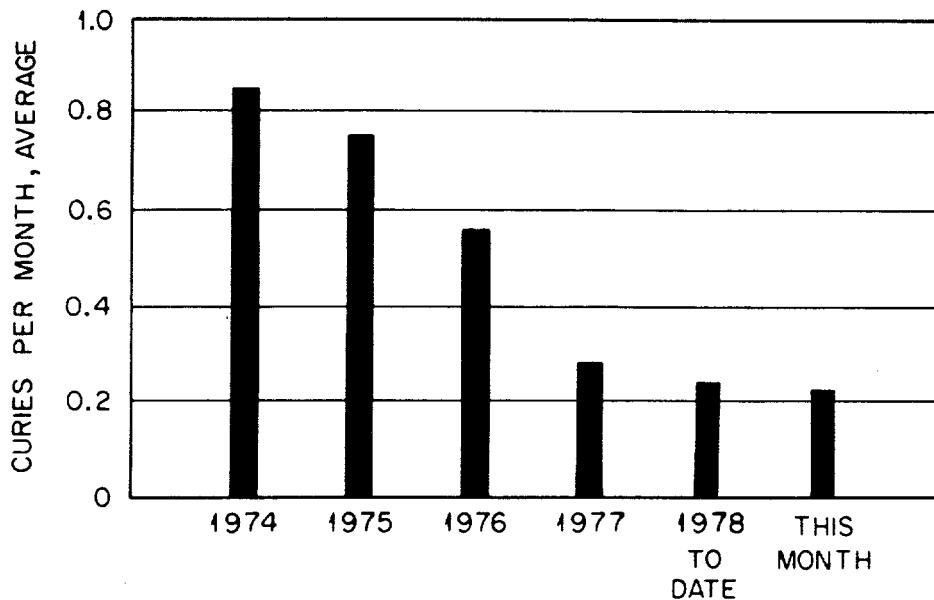


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL - DWG 75-2540R3

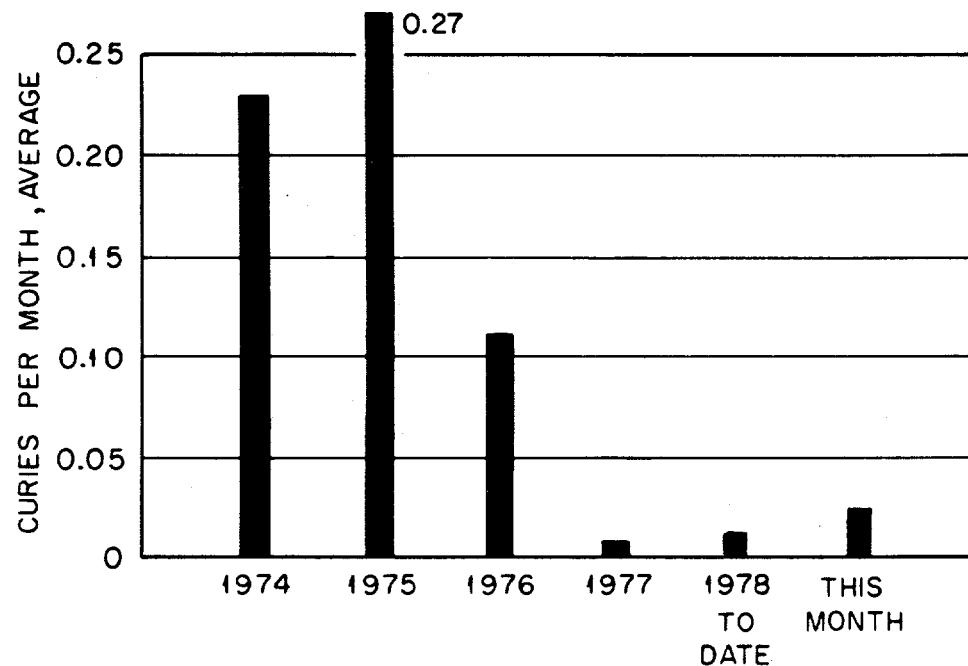


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

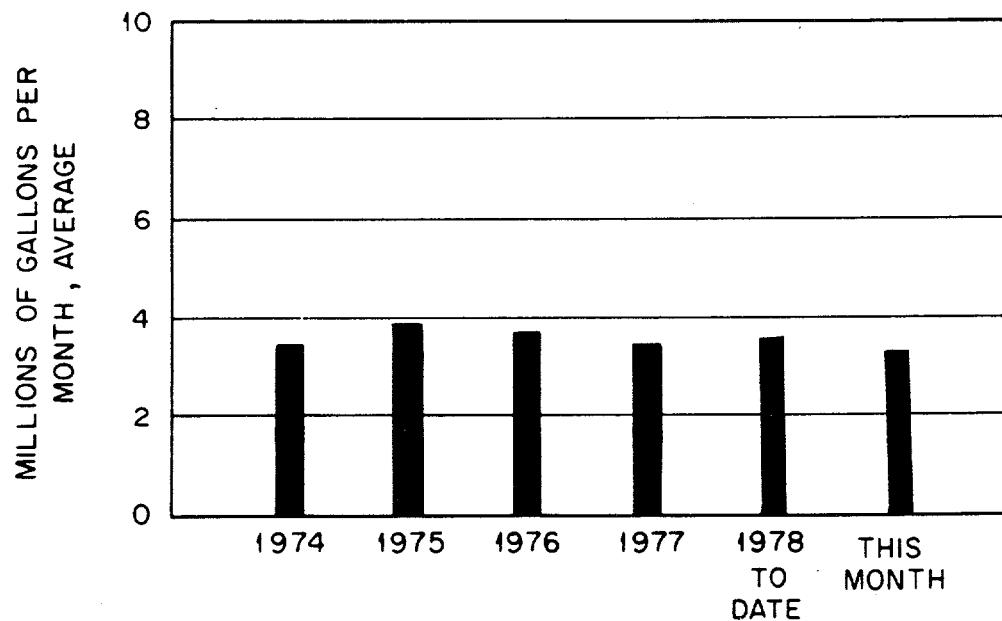


Fig 4. Process Waste Volumes.

ORNL-DWG 75-2541R3

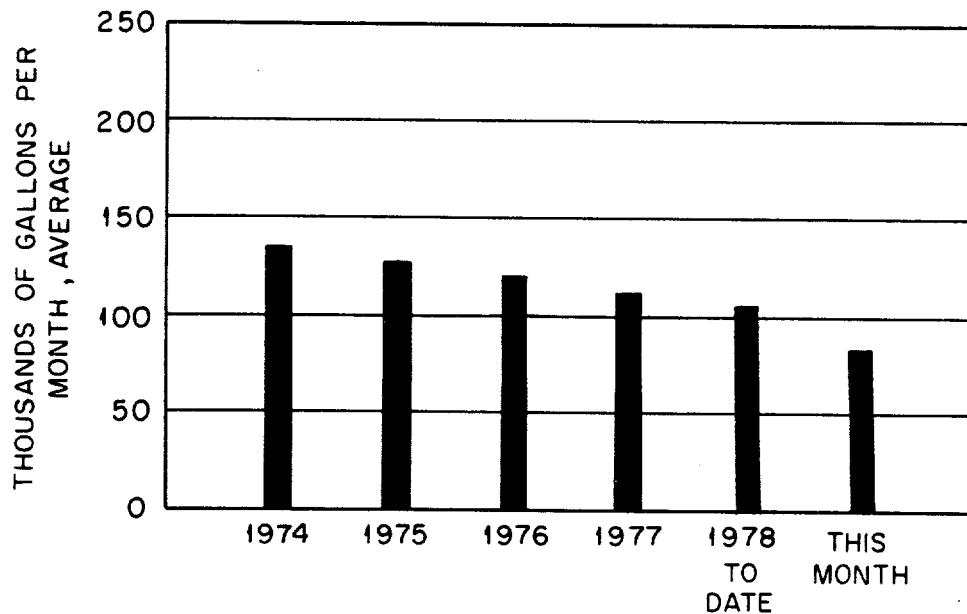
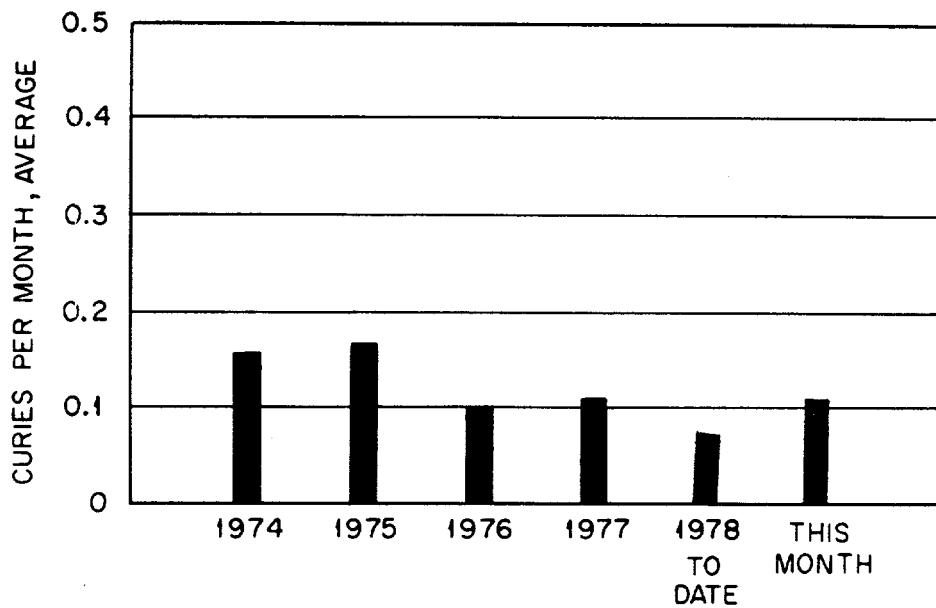


Fig 5. Intermediate - Level Waste Volumes.

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

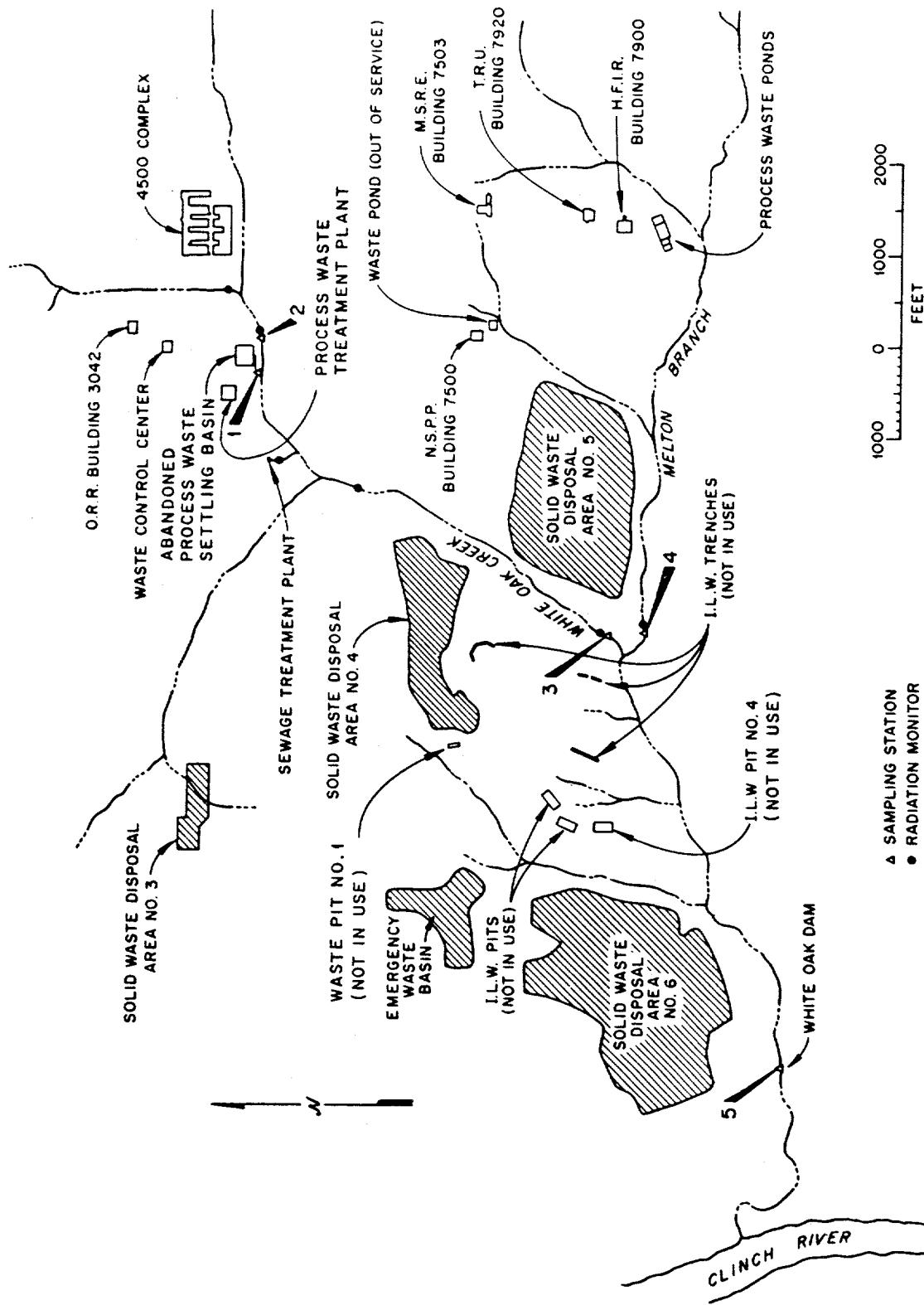


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.027	0.08
Miscellaneous discharges from east end of plant	2	0.012	0.02
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.183	0.45
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.046	0.11
Total discharge from all sources	3,4	0.229	0.56
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.20

^a Refers to Fig. 7.

^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ${}^{90}\text{Sr}$.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml ^a	Gross-Beta Curies	% of Total	Volume Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	26.8	0.009	1.0	0.05	1.5
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.182 ^c	20.5	0.41	12.5
3. Reactor Operations (MH112)	2.8	0.020	2.3	1.03	31.5
4. Buildings 3503 and 3508	1.5	0.001	0.1	0.09	2.8
5. Buildings 3025 and 3026	1.4	0.002	0.2	0.25	7.7
6. Building 3019	2.5	0.004	0.5	0.23	7.0
7. Waste Evaporator, Bldg. 2531	24.8	0.041	4.6	0.24	7.3
8. Building 3525	<0.1	<0.001	—	0.14	4.3
9. Building 2026	0.4	<0.001	—	0.09	2.8
10. Tank Farm Drainage	125	0.629	70.8	0.74	22.6

^a Counted at 30% geometry.^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .^c The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRAL	2026	< 0.01	0.5
Central Radioactive Gas Disposal Facilities	3039	0.09	356
Radiochemical-Processing Pilot Plant	3020	< 0.01	0.5
MSRE	7512	< 0.01	0.3
HFIR & TRU	7911	0.02	7
Total Activity in Gases Released at X-10 Site		0.11	364
Chem. Tech. Division - Y-12 Area		0.4	
Tritium Target Fabrication Building		$^{3}(^{3}\text{H})$	
Building 4508 Ventilation Discharges			
Room 136			5.8×10^{-3}
Room 265			5.6×10^{-3}
Building 5505 Discharges			
Glove Box			3.0×10^{-3}
Hood			3.9×10^{-3}

a Activity primarily ^{131}I except as noted.

b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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CENTRAL FILES NUMBER

CF-78/240

DATE: July 10, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May, 1978

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release
to the public by:

Daryl R. Hermon 7/12/96
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of May, 1978, was 0.76% of the MPC_W (see Figure 1). This is higher than normal because of a low flow in the Clinch River. The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.54% MPC_W and 0.16% MPC_W, respectively. These values represent 0.19 Ci of ⁹⁰Sr and 590 Ci of ³H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 244.29 and 66.25 million gallons, respectively.

Despite a flow reduction during the period (4%), the amount of ⁹⁰Sr released by the White Oak Creek watershed increased by 12 mCi - most of this activity can be attributed to the Process Waste Treatment Plant discharge. The 190 pond system and the sanitary system discharged 3 mCi and 12 mCi of ⁹⁰Sr, respectively. It appears that the problems associated with these areas have been corrected, in part, by the operating changes completed last month (see ORNL CF-78/204, the Waste Disposal Report for April, 1978).

Process Waste

A total of 4.37 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity

released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The head-end or water softening process of the treatment plant continued to operate poorly for most of the period. This poor performance is attributed to adverse conditions of the feed water chemistry. The plant was shut down at the beginning of the month for the purpose of cleaning the slurry and scale accumulation from the precipitator-clarifier and the surge tank.

A brief summation of plant operations is listed below:

Ion Exchange Column Operating Data

<u>Run No.</u>	<u>Column</u>	<u>Run Time</u>	<u>Bed Volumes</u>
135	A	57.5 Hrs.	747
136	B	121.0 "	1755
137	C	134.0 "	1781
138	A	138.5 "	1897
139	B	142.5 "	1897
140	C	96.0 "	1321
141	A	54.5 "	483
142	B	63.0 "	588
143	C	109.5 "	1457

OPERATING PROBLEMS AND PLANT IMPROVEMENTS

Over the past several months, there have been numerous occasions when the precipitator-clarifier output has exceeded the design purity limit of 10 ppm hardness (CaCO_3) for prolonged periods of time. This results when the chemical composition of the feed water grossly exceeds design conditions. The net effect of the chemical overload in the feed water is to shift the purification load to the ion exchange system which results in lower column throughput, and, in several instances, an activity breakthrough with a resultant loss of overall plant efficiency. There is little control exercised over the types of chemicals discharged into the Process Waste System, and the current restrictions imposed by the EPA tend to compound the problem. Obviously, this is a problem which will not disappear in the future.

There are several other plant deficiencies: The columns cannot be operated in series and the column inlet-outlet distributors are poorly designed. There is evidence (both physical and analytical) of flow channeling through the column, and it is possible that approximately one-third of the resin is not being utilized. The volume of the sulphuric acid system designed to readjust the pH of the plant effluent is inadequate. The original plant design provided no ancillary systems (tanks, etc.) for the purpose of additional chemical addition; for example: Na_2CO_3 to the clarifier feed. These problems are currently being appraised, and eventually mechanical systems will be added and piping systems altered as corrective measures are undertaken.

A sampling program designed to evaluate the ion exchange phase of the treatment facility was completed several months ago under the direction of John Chilton (Chemical Technology Division), and the analytical data

obtained are currently being evaluated. It is possible that some revisions to the regeneration procedures will be incorporated as a result of this study.

Intermediate Level Waste

	<u>Gallons</u>
<u>Total volume generated</u>	101,000
<u>Volume transferred to evaporator</u>	102,000
<u>Tank Farm free space at beginning of month</u>	366,000
<u>Tank Farm free space at end of month</u>	363,000
<u>Evaporator concentrate returned to tank farm</u>	4,000
<u>Volume of concentrate available for hydrofracture</u>	105,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
<u>Building 3019</u>	6,900
<u>Fission Products Development Laboratory</u>	4,800*
<u>ORR and BSR</u>	16,200
<u>High Flux Isotope Reactor</u>	29,100
<u>Radioisotopes Process Area</u>	9,700
<u>4500 Complex</u>	7,900
<u>Transuranium Processing Area</u>	1,700

The ORNL stacks discharged 38 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 466 μCi . Inert gases released from the 3039 and 7911 stacks averaged less than 0.9% and 0.2% of the calculated maximum permissible operating level for these

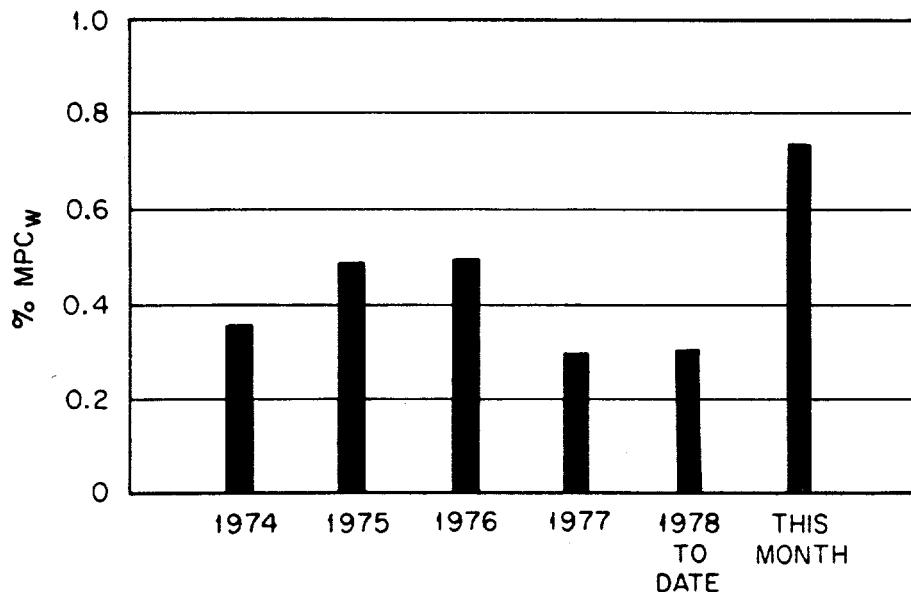
* The storage tank pit has an inleakage problem from groundwater and this is the volume of water jettied from the pit during the month. The "pit" can only be jettied to ILW, since it was designed in this fashion.

stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The increase noted on Figure 6 is the result of a spill in the Iodine Production Cell.

Unusual Occurrences

1. The pH as measured at Station 3 (White Oak Creek) exceeded the upper limit of 9 units twice during the reporting period (May 25 and 30). In both instances, a lack of sulfuric acid at the Process Waste Treatment Plant was the cause of the infraction. The acid is employed to readjust the pH of the discharge water to 7.
2. A radioactive spill of less than 100 gallons (estimated) was discovered on May 5 along Third Street opposite the Equalization Basin. The material was concentrated strip solution from the Process Waste Treatment Plant which was contaminated with low level amounts of ^{90}Sr and ^{137}Cs . About 6 cubic yards of contaminated dirt was removed for burial. The line has been punctured by an air hammer bit during the installation of a waste transfer line from Bldg. 1504.

ORNL-DWG 75-2539R3



Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

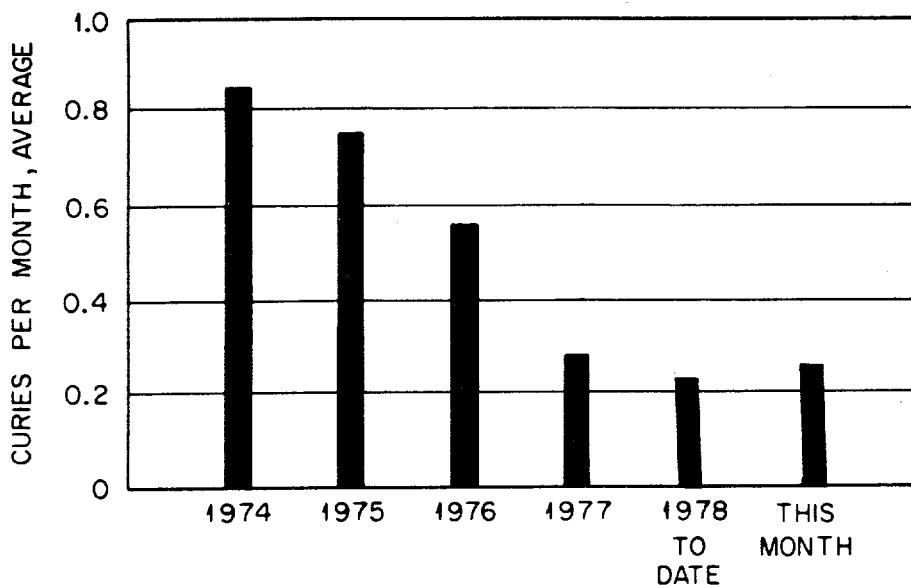


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

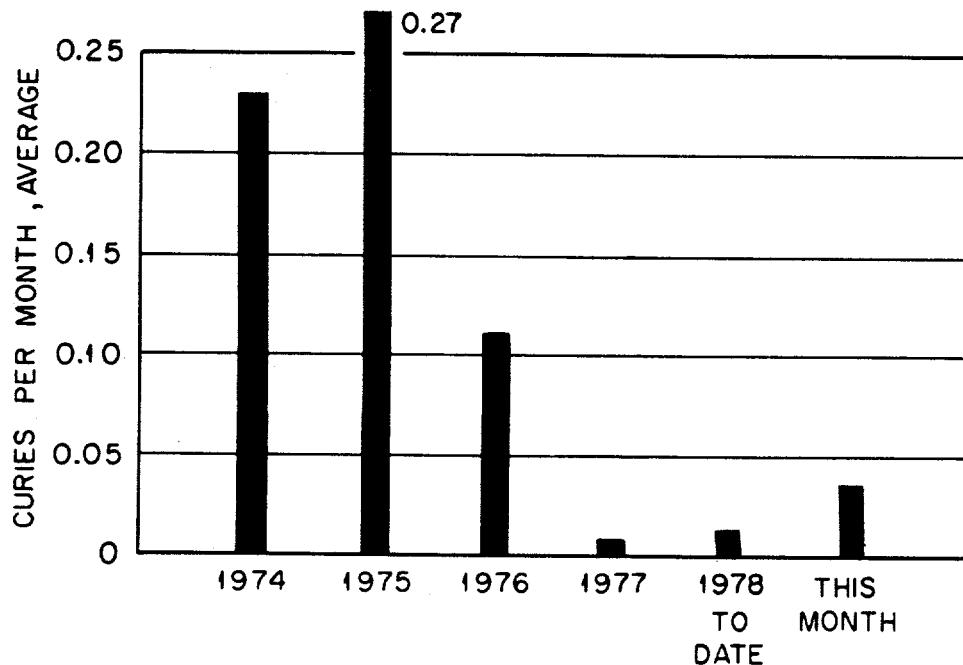


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

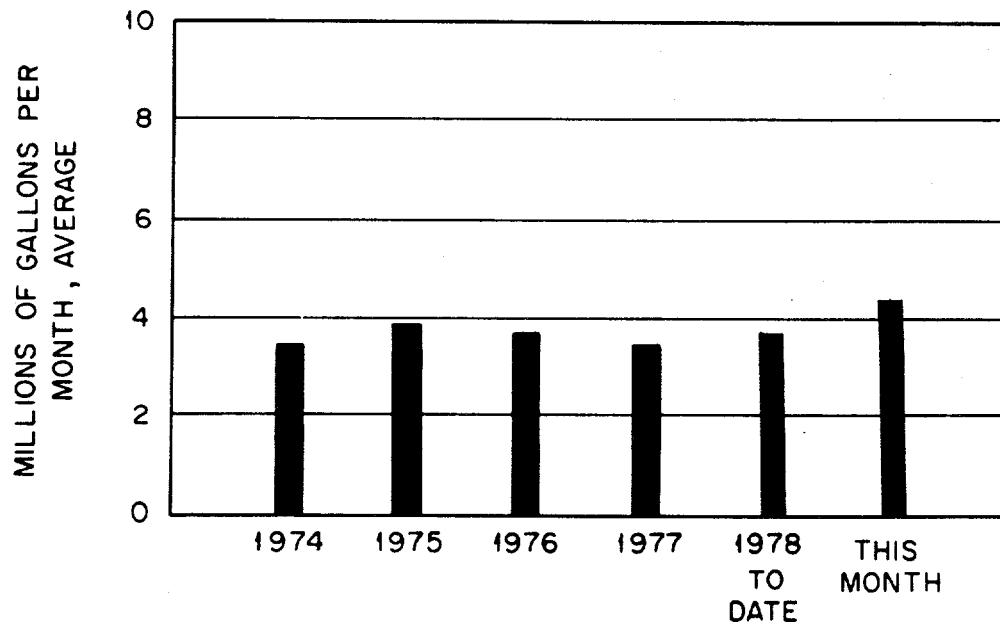


Fig 4. Process Waste Volumes.

ORNL-DWG 75-2541R3

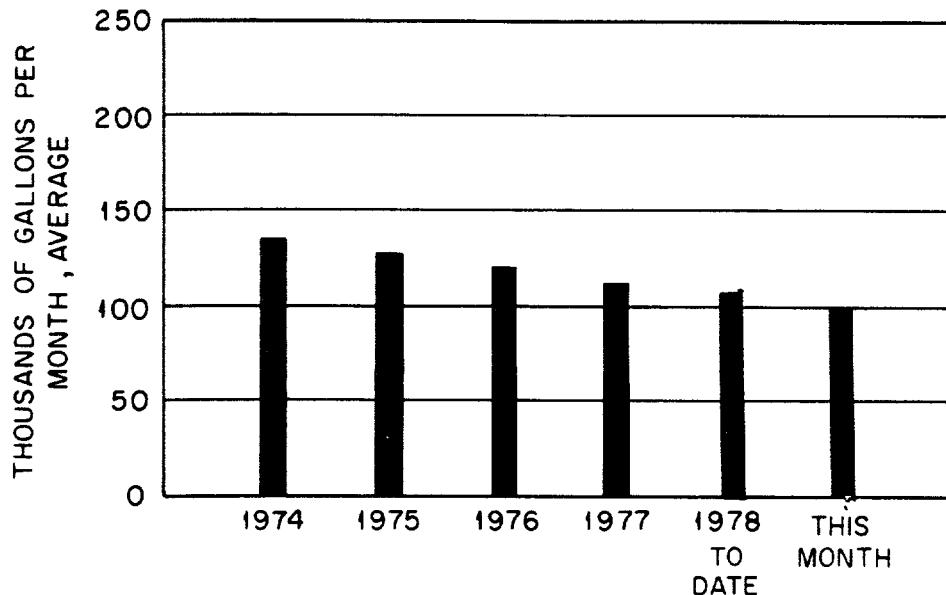
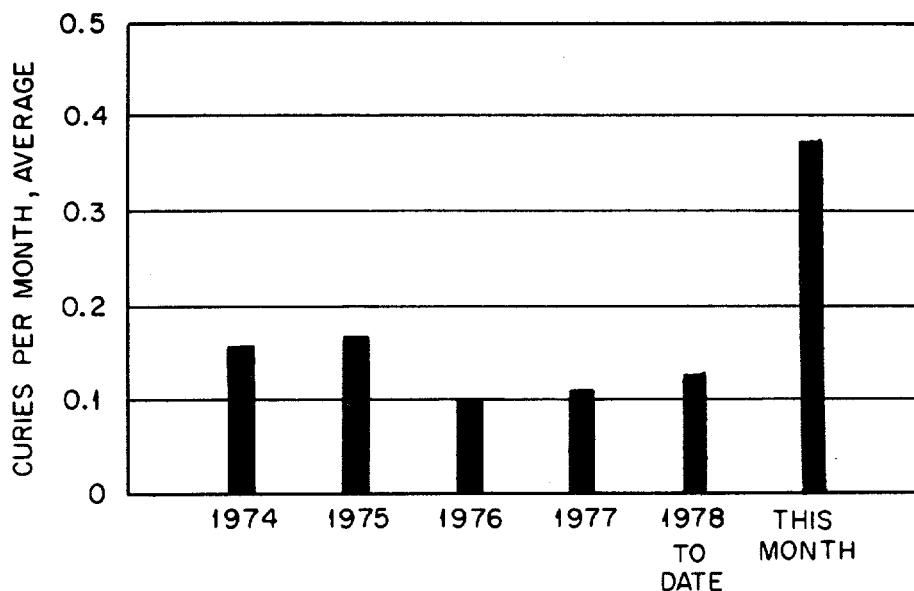


Fig 5. Intermediate - Level Waste Volumes.

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

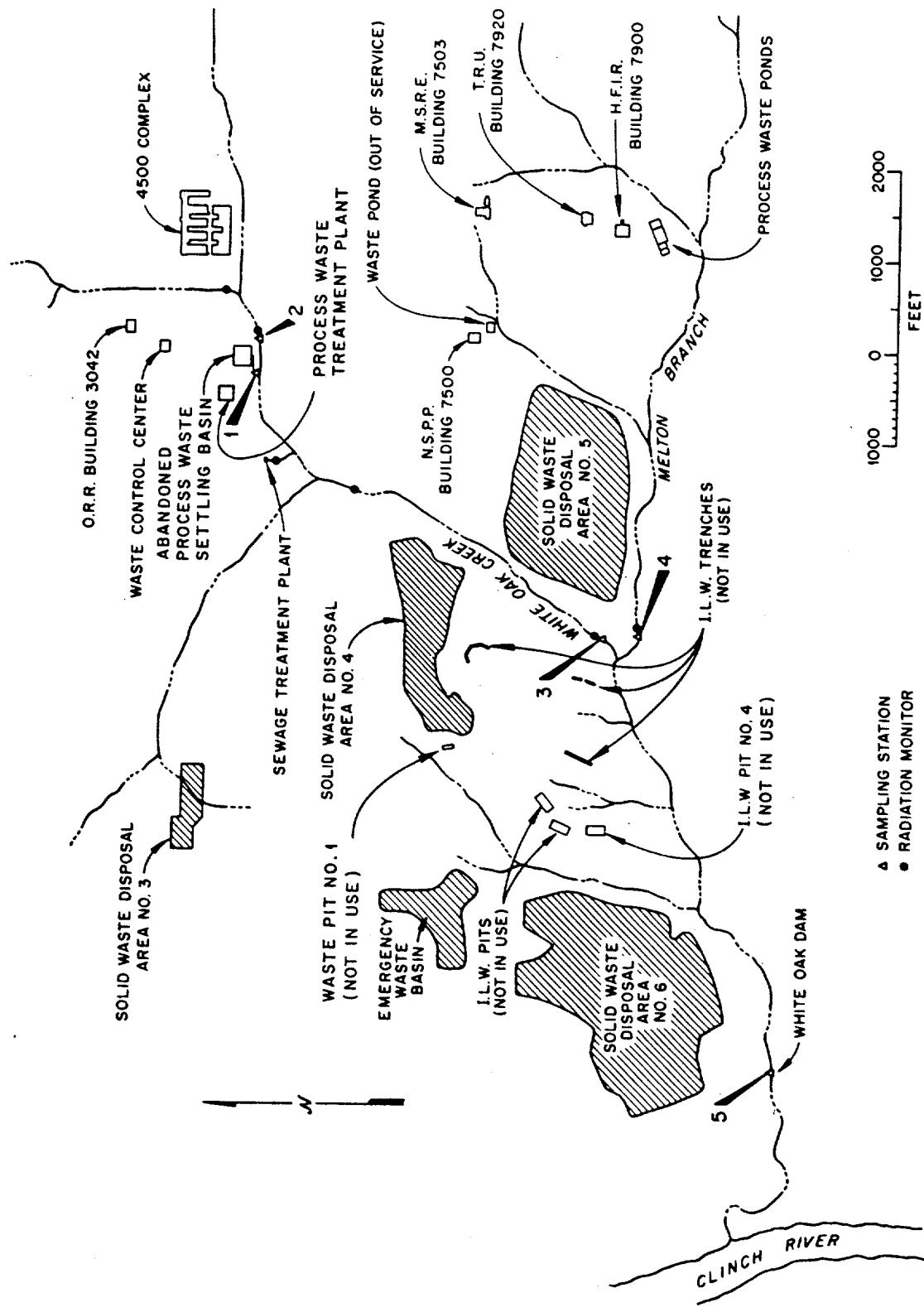


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.034	0.101
Miscellaneous discharges from east end of plant	2	0.017	0.034
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.195	0.399
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.056	0.122
Total discharge from all sources	3,4	0.251	0.521
White Oak Dam to Clinch River (Health Physics Measurement)	5	0.19	0.30

^a Refers to Fig. 7.

^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	Activity Average c/m/ml ^a	Gross-Beta		Gross-Beta		Volume Million Gallons	% of Total
		Curies ^b	% of Total	Curies ^b	% of Total		
1. Radioisotopes Processing Area (MH234)	40.8	0.028	1.9	0.10	2.8		
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.341 ^c	23.9	0.61	17.0		
3. Reactor Operations (MH112)	0.96	0.005	0.4	0.70	19.5		
4. Buildings 3503 and 3508	4.1	0.004	0.3	0.15	4.2		
5. Buildings 3025 and 3026	2.0	0.005	0.4	0.36	10.1		
6. Building 3019	1.7	0.003	0.2	0.25	7.0		
7. Waste Evaporator, Bldg. 2531	8.3	0.014	1.0	0.25	7.0		
8. Building 3525	0.07	< 0.001	—	0.12	3.3		
9. Building 2026	2.6	0.002	0.1	0.10	2.8		
10. Tank Farm Drainage	160	1.023	71.8	0.94	26.3		

^a Counted at 30% geometry.^b Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .^c The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	< 0.01	0.1
Central Radioactive Gas Disposal Facilities	3039	\leq 0.38	459
Radiochemical-Processing Pilot Plant	3020	< 0.01	1.2
MSRE	7512	< 0.01	0.2
HFIR & TRU	7911	< 0.01	5
Total Activity in Gases Released at X-10 Site		\leq 0.38	466
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		1.2 (³ H)	
Building 4508 Ventilation Discharges			
Room 136			0.002
Room 265			\leq 0.0002
Building 5505 Discharges			
Glove Box			\leq 0.002
Hood			\leq 0.039

^a Activity primarily ¹³¹I as noted.^b These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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CENTRAL FILES NUMBER

CF-78/274

780810

DATE: August 10, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1978

TO: Distribution

FROM: L. C. Lasher

Sponsored by: J. A. Cox

This document has been approved for release
to the public by:

Darrel Hamon 7/12/96
Technical Information Officer Date
ORNL Site

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SUMMARY

Operation of the Liquid and Gaseous Waste System for the month of June was about normal. The performance of the Process Waste Treatment Plant improved during the month. The total ^{90}Sr discharged to White Oak Creek was 132 mCi compared to 251 mCi for the previous month. The ORNL Stacks discharged 218 mCi of ^{131}I . There were no unusual incidents during the month.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1978, was 0.2% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ⁹⁰Sr and ³H, were 0.13% MPC_W and 0.04% MPC_W, respectively. These values represent 0.14 Ci of ⁹⁰Sr and 434 Ci of ³H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

The total release of ⁹⁰Sr into White Oak Lake (132 mc) was 119 mc less than the amount reported for May. This improvement is attributed to a lower amount of precipitation during the period and a reduction in the amount of ⁹⁰Sr discharged from the process waste system. The amount of ⁹⁰Sr released from the 190 ponds and the sanitary system into White Oak Creek remained essentially unchanged at 2.3 mc and 9.7 mc, respectively.

The following tabulation shows a breakdown of ⁹⁰Sr entering White Oak Creek compared to that measured at Station 3. The difference is presumed to be coming from Burial Ground No. 4 and other contaminated areas along White Oak Creek.

	<u>⁹⁰Sr, mCi</u>	<u>⁹⁰Sr, mCi</u>
Flume	13.0	
190 Ponds	2.3	
Process Waste Treatment Plant	13.0	
Sewage Treatment Plant	<u>9.7</u>	
	<u>38.0</u>	
Station 3, WOC	83.0	
Burial Ground No. 4		45.0
Station 4, Melton Branch (Burial Ground No.5)	<u>49.0</u>	<u>49.0</u>
Total ⁹⁰ Sr to WOC	132	
Total ⁹⁰ Sr from Burial Grounds (presumed)		94
% ⁹⁰ Sr Presumed from Burial Grounds		71%

Process Waste

A total of 4.0 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

Radioactive decontamination at the water treatment facility improved during the period, but the water softening process (precipitator-clarifier) remained abnormal - the hardness of the clarifier product water averaged 3-4 times the normal value of 10 ppm. The problem appears to be a chemical aberrance of the feed water. However, analytical techniques have thus far failed to pinpoint the problem. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
114	B	148	2554
145	A	83.5	1445
146	B	147.5	1993
147	C	139.5	1668
148	A	135.5	1924
149	B	184	3002

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 119 gph.

	<u>Gallons</u>
<u>Total volume generated</u>	<u>97,000</u>
<u>Volume transferred to evaporator</u>	<u>86,000</u>
<u>Tank Farm free space at beginning of month</u>	<u>363,000</u>
<u>Tank Farm free space at end of month</u>	<u>350,000</u>
<u>Evaporator concentrate returned to tank farm</u>	<u>2,000</u>
<u>Volume of concentrate available for hydrofracture</u>	<u>109,000</u>

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	<u>Gallons</u>
<u>Building 3019</u>	<u>8,500</u>
<u>Fission Products Development Laboratory</u>	<u>7,000*</u>
<u>ORR and BSR</u>	<u>14,200</u>
<u>High Flux Isotope Reactor</u>	<u>25,900</u>
<u>Radioisotopes Processing Area</u>	<u>10,800</u>
<u>4500 Complex</u>	<u>4,500</u>
<u>Transuranium Processing Area</u>	<u>1,700</u>

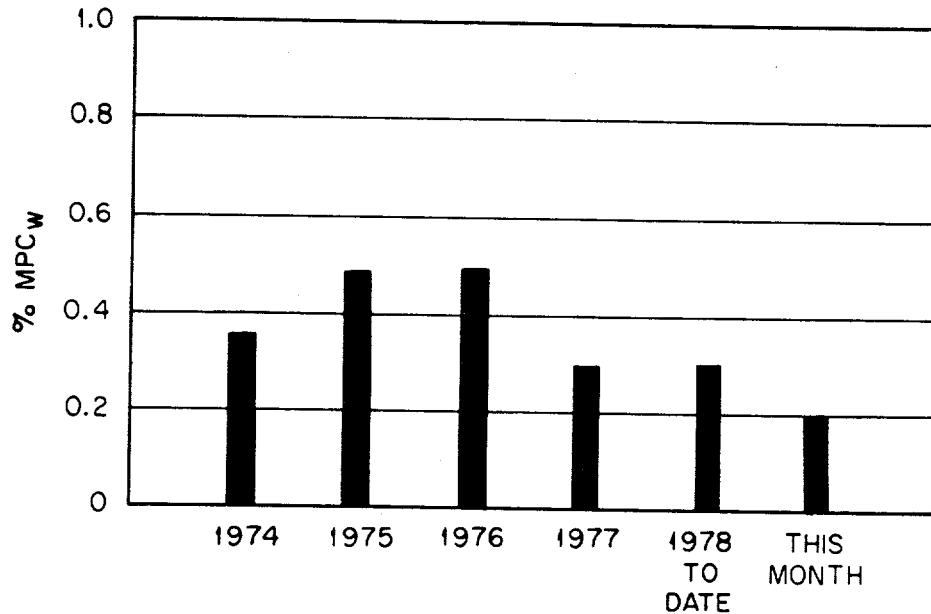
GASEOUS WASTE

The ORNL stacks discharged 218 mCi of ^{131}I this month. The bulk of this activity was released by the 3039 system as a result of ^{131}I processing. The filterable particulate activities released during the period amounted to 411 μCi . Inert gases released from the 3039 and 7911 stacks averaged less

* Storage tank pit has a water inleakage problem from groundwater. This represents the volume jetted from the storage tank pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

less than 1.2% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

ORNL-DWG 75-2539R3



Calculated Percent of MPC in Clinch River Due to ORNL Discharges.
(Health Physics Measurements at White Oak Dam)

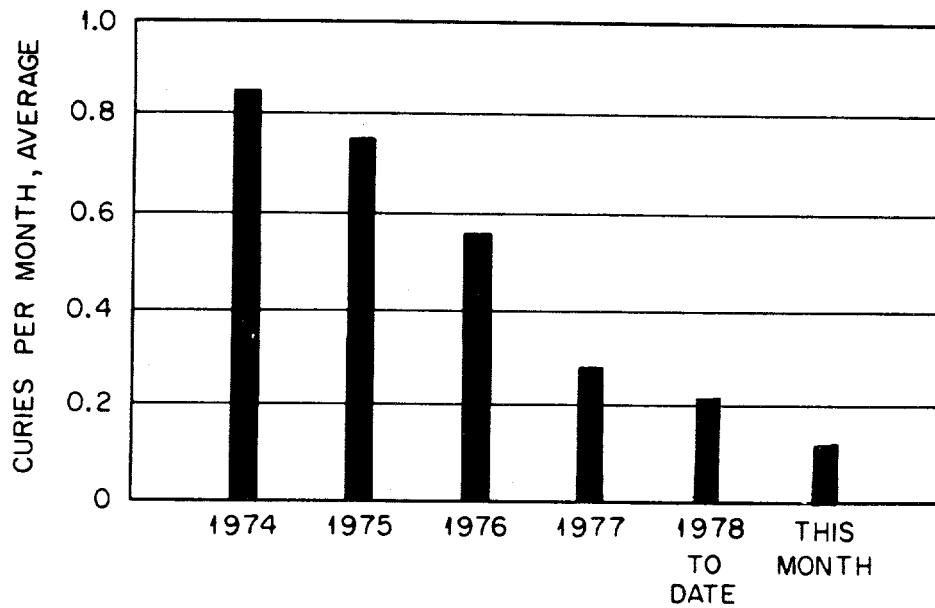


Fig 2. ⁹⁰Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

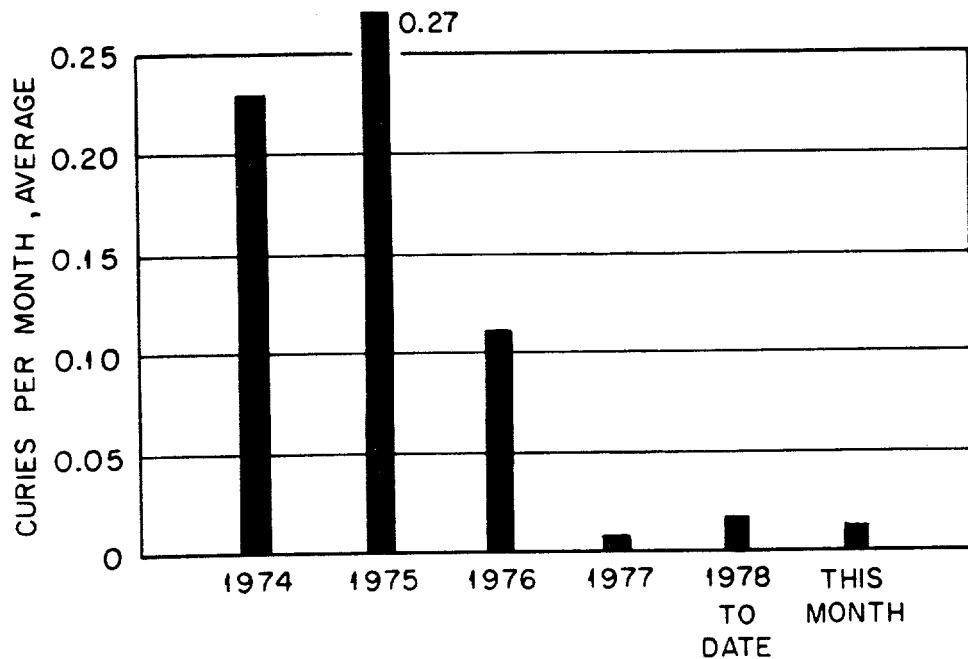


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

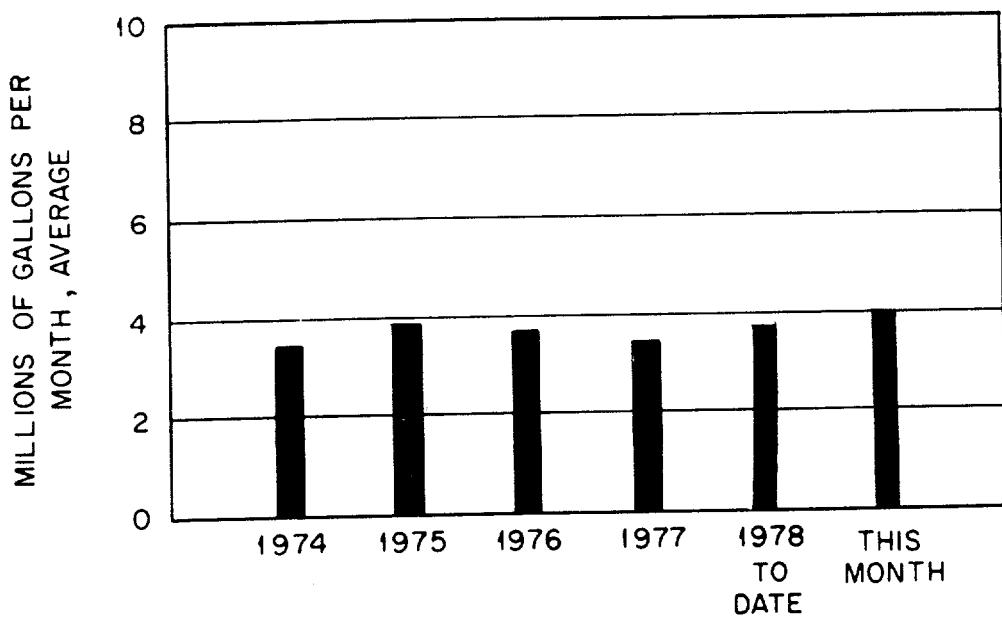


Fig 4. Process Waste Volumes.

ORNL-DWG 75 - 2541R3

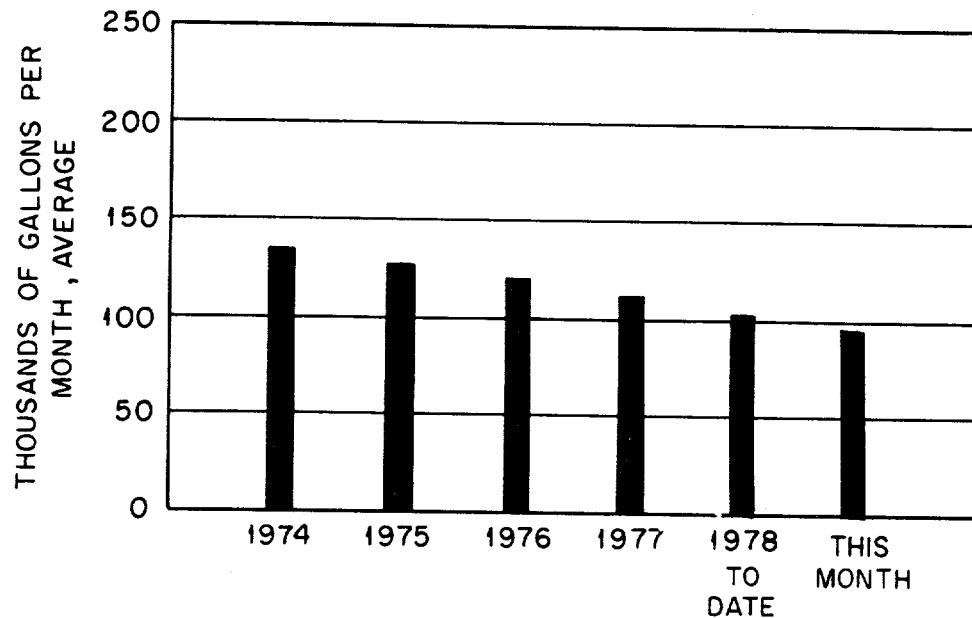
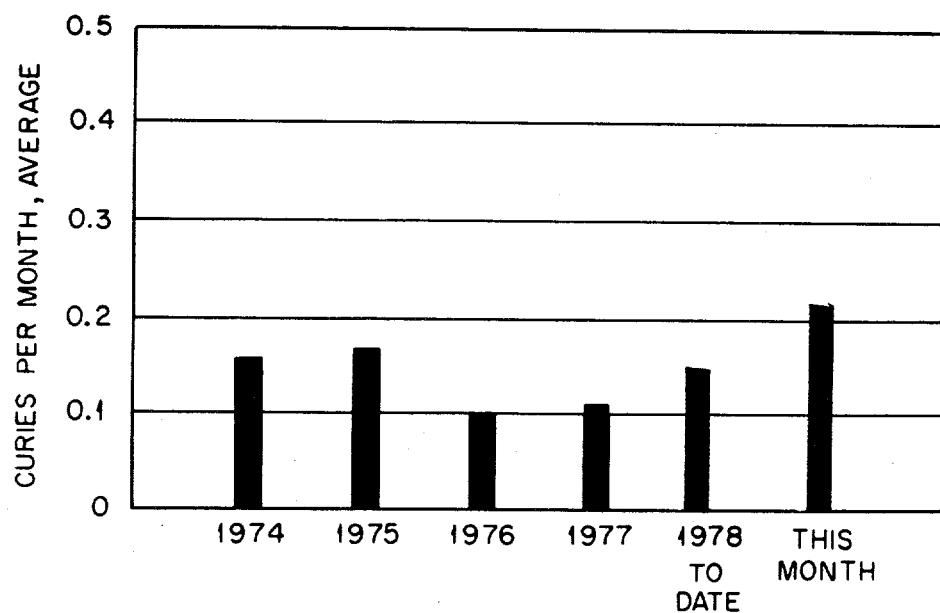


Fig 5. Intermediate - Level Waste Volumes.

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I ; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

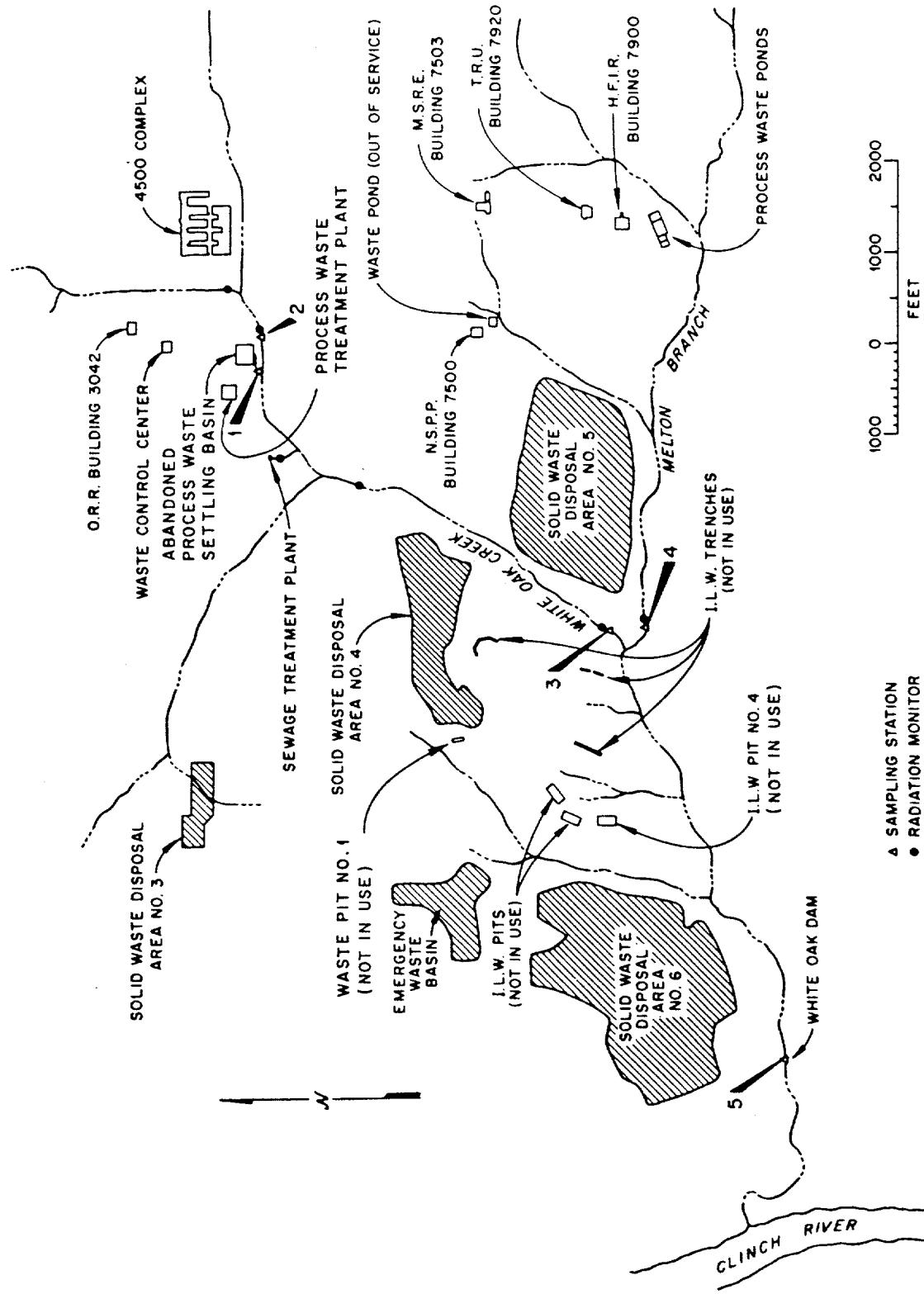


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies	Gross Beta, Curies ^b
Process Waste	1	0.013	0.056
Miscellaneous discharges from east end of plant	2	0.013	0.036
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.083	0.205
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.049	0.097
Total discharge from all sources	3,4	0.132	0.302
White Oak Dam to Clinch River (Health Physics measurement)	5	0.14	0.18

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharged to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

Table 2. Process-Waste Discharges

	90Sr Activity dpm/ml	90Sr Curies	% of Total	Volume Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	100	0.010	1.6	0.06	1.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.157 ^a	25.7	0.68	18.0
3. Reactor Operations (MH112)	0.7	0.001	0.2	0.77	20.4
4. Buildings 3503 and 3508	7.3	0.002	0.3	0.18	4.8
5. Buildings 3025 and 3026	1.5	0.002	0.3	0.65	17.2
6. Building 3019	6.0	0.002	0.3	0.19	5.0
7. Waste Evaporator, Bldg. 2531	68.5	0.026	4.3	0.22	5.8
8. Building 3525	0.2	< 0.001	—	0.13	3.4
9. Building 2026	17.6	0.003	0.5	0.09	2.4
10. Tank Farm Drainage	297	0.409	66.8	0.81	21.4

^aThe activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity ^a (Curies)	Filterable Particulate Activity ^b (Microcuries)
HRLAL	2026	\leq 0.01	0.1
Central Radioactive Gas Disposal Facilities	3039	0.22	404
Radiochemical-Processing Pilot Plant	3020	\leq 0.01	1
MSRE	7512	\leq 0.01	0
HFIR & TRU	7911	\leq 0.01	6
Total Activity in Gases Released at X-10 Site		0.22	411
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		1.8 (^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			0.013
Room 265			0.017
Building 5508 Discharges			
Glove Box			\leq 0.002
Hood			\leq 0.004

^aActivity primarily ^{131}I except as noted.^bThese values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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ORNL/CF-78/303

DATE: September 8, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July, 1978

TO: Distribution

FROM: L. C. Lasher

SPONSORED BY: J. A. Cox

This document has been approved for release
to the public by:

David R. Hamlin 9/4/96
Technical Information Officer Date
ORNL Site

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Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number ^a	Total Sr, Curies ^b	Gross Beta, Curies ^b
Process Waste	1	0.011	0.051
Miscellaneous discharges from east end of plant	2	0.013	0.027
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.067	0.164
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.036	0.084
Total discharge from all sources	·	3.4	0.103
White Oak Dam to Clinch River (Health Physics measurement)	5	0.14 ^c	0.18 ^c

^aRefers to Fig. 7.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr .

^cJune data - July figures not available at the time this report was prepared. These figures will be shown next month.

DATE ISSUED APR 22 1985

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DATE: March 8, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND
EFFLUENT MONITORING REPORT FOR THE MONTH OF NOVEMBER 1984

TO: Distribution

FROM: L. C. Lasher ²

Sponsor: J. H. Swanks

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Table 1. Activity Released to White Oak Lake

<u>Source</u>	<u>Monitoring Station Number</u>	<u>Total Sr (Ci)</u>	<u>Gross Beta (Ci)^b</u>
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.120	0.264
Discharge from Melton Valley Operations and Burial Ground 5	4	0.049	0.103
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits Burial Ground 6	West Weir	0.007	-----
Total Discharge from All Sources		0.176	0.367
White Oak Dam to Clinch River (EOS Measurements)		0.200	0.390

^aRefers to Figure 3.

^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-85/86

DATE: March 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND
EFFLUENT MONITORING REPORT FOR THE MONTH OF DECEMBER 1984

TO: Distribution

FROM: L. C. Lasher ¹²

Sponsor: J. H. Swanks

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Table 1. Activity Released to White Oak Lake

	Monitoring Station Number	Total Sr (Ci)	Gross Beta (Ci) ^b
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.091	0.144
Discharge from Melton Valley Operations and Burial Ground 5	4	0.033	0.069
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.011	-----
Total Discharge from All Sources		0.135	0.213
White Oak Dam to Clinch River (EOS Measurements)		0.160	0.350

^aRefers to Fig. 3.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr .

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ORNL/CF-85/328

DATE: June 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND
EFFLUENT MONITORING REPORT FOR THE MONTH OF JANUARY 1985

TO: Distribution

FROM: L. C. Lasher

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Table 1. Activity Released to White Oak Lake

	Monitoring Station Number ^a	Total Sr (Ci)	Gross Beta (Ci) ^b
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.140	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.041	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.0001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.004	-----
Total Discharge from All Sources		0.185	
White Oak Dam to Clinch River (EOS Measurements)		0.410	0.76

^aRefers to Fig. 3.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr .

NOV 22 1985

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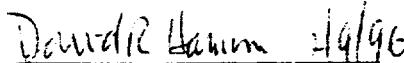
DATE: September 7, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND
EFFLUENT MONITORING REPORT FOR THE MONTH OF MAY 1985

TO: Distribution

FROM: C. B. Scott

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Table 1. Activity Released to White Oak Lake

	Monitoring Station Numbera	Total Sr (C1)	Gross Beta (C1)b
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.050	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.016	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	---
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	<0.001	---
Total Discharge from All Sources		0.066	
White Oak Dam to Clinch River (EOS Measurements)		0.120	0.19

^aRefers to Fig. 9.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr .

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DATE: September 7, 1985**SUBJECT:** RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND
EFFLUENT MONITORING REPORT FOR THE MONTH OF JUNE 1985**TO:** Distribution**FROM:** C. B. Scott**Sponsor:** J. H. Swanks

This document has been approved for release
to the public by:

David R. Hamm 11/96
Technical Information Officer Date
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Table 1. Activity Released to White Oak Lake

	Monitoring Station Number ^a	Total Sr (Ci)	Gross Beta (Ci) ^b
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.094	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.010	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.0003	
Total Discharge from All Sources		0.104	
White Oak Dam to Clinch River (EOS Measurements)		0.074	0.160

^aRefers to Fig. 9.^bApproximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr .